THE UNIVERSITY OF ALBERTA

THE RECREATIONAL CAPABILITY AND USE OF WABAMUN LAKE AND THE EASTERN HALF OF LESSER SLAVE LAKE

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled The Recreational Capability and Use of Wabamun Lake and the Eastern Half of Lesser Slave Lake, submitted by David Lawrence Anderson in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

Physical capability and accessibility are the two most important factors affecting the use of the recreation resources of any area. In this thesis, both factors are analyzed to determine their relative significance in the present recreational use of Wabamun Lake and the eastern half of Lesser Slave Lake.

The first part of the thesis is devoted to a detailed assessment of each lake's physical capability to support recreation. The Canadian Land Capability Classification for Outdoor Recreation is the tool which is used to obtain an objective analysis. It provides both a meaningful and valid evaluation of the recreational capability of each lake and a scientific basis for comparing them to each other. The results of the capability inventories are both mapped and described in the text.

A patronage survey was completed for each subject lake so that the use of cottage and public areas could better be understood. The survey results also elucidated the attitudes of these recreationists towards Wabamun Lake and the eastern half of Lesser Slave Lake. When the crucial factors of remoteness, fair driving distances and accessibility were related to present recreational use and development, the picture became complete. The eastern half of Lesser Slave Lake has a high recreational capability compared to the medial quality of Wabamun Lake. Nevertheless, it was found that distance and accessibility are the major influences on use. Therefore, the northern lake has little development and use whereas Wabamun Lake, which is near Edmonton, is intensively used despite its marginal recreation potential.

ACKNOWLEDGEMENTS

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INTRODUCTION

The use, or potential use, of any recreational resource is determined primarily by two factors: the physical qualities of the resource and its accessibility from a major centre of demand. The purpose of this thesis is to study the recreational capabilities and use of two areas which differ in both these factors. The eastern half of Lesser Slave Lake has excellent physical qualities for outdoor recreation but is 162 miles from Edmonton, the nearest urban centre of any size; moreover, the connecting highway is gravelled for about 42 miles. Wabamun Lake, by contrast, is only 45 to 55 miles from Edmonton on a first-class highway. Its environmental qualities are no more than mediocre, but, because of its proximity to a large metropolitan population, much of its shoreline has been developed for very intensive use. This is a pronounced contrast to the almost undeveloped nature of the shores of Lesser Slave Lake.

Before dealing further with the purpose of the thesis and the delimitation of the study areas, several terms must be defined. 'Recreation' is defined in The Concise Oxford Dictionary as "refreshment, entertainment or the amusement of oneself."[1] This concept is also embodied in John L. Hutchinson's definition of recreation as "a worthwhile, socially accepted leisure experience that provides immediate and inherent satisfaction to the individual who voluntarily participates in an activity."[2]

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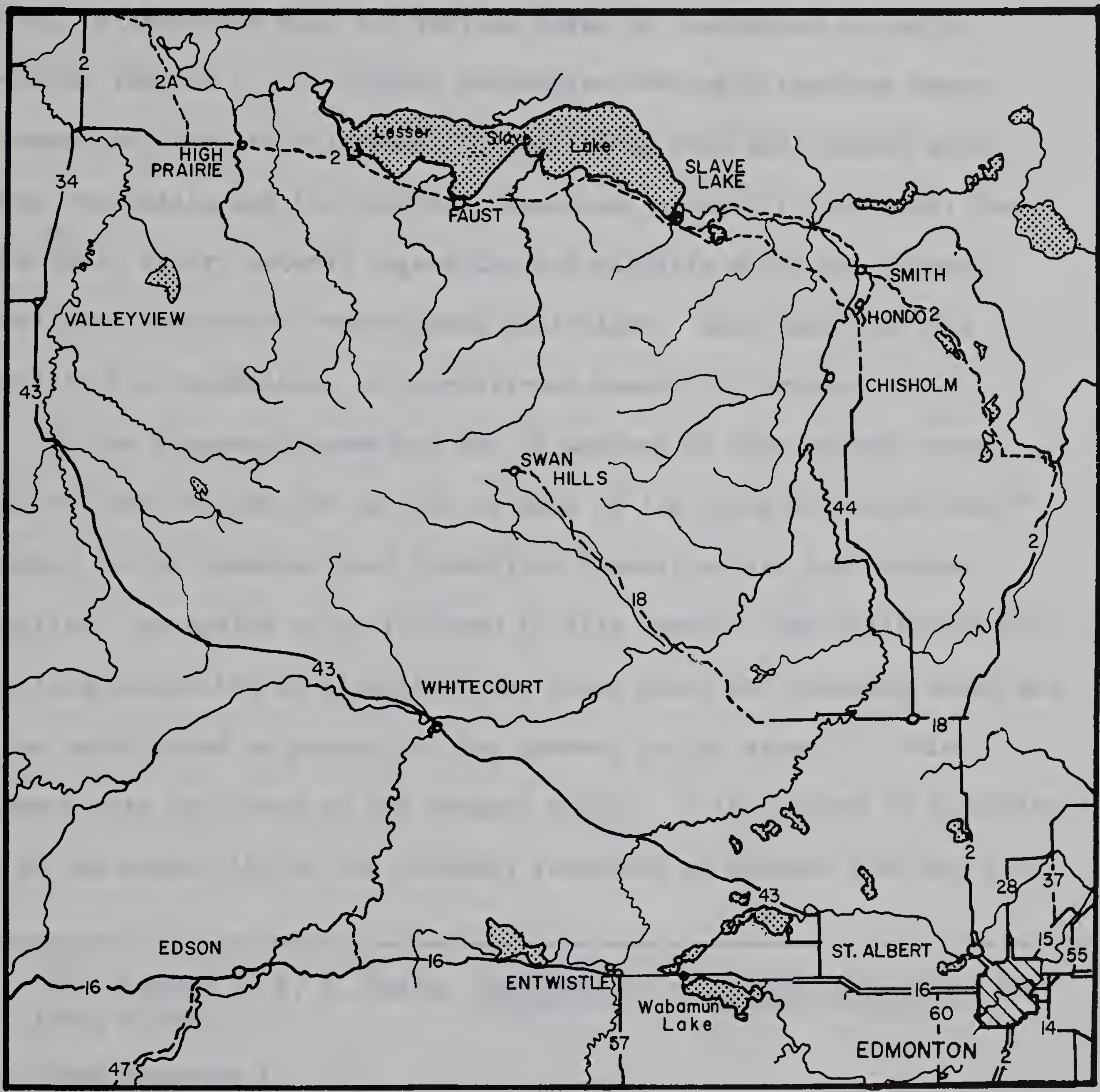
[1] The Concise Oxford Dictionary of Current English, revised by Fowler, H. W. and Mesurier, H. G., Oxford, 1938, p. 976.

[2] J. L. Hutchinson quotation in Ottoson, H. W., Land Use Policy and Problems in the United States, Lincoln, 1963, p. 257.

Figure 1 LOCATION OF SUBJECT LAKES



SOURCE: Alberta Highways Map 1967

FOUR-LANE PAVED HIGHWAY: 16

TWO-LANE PAVED HIGHWAY: 18

GRAVELLED HIGHWAY: 2

Miles 10 5 0 10 30 50 70

TOWN: EDSON

CITY:

RIVER:

LAKE:

Thus, recreation is simply enjoyable leisure-time activity that people engage in by choice. Clawson described outdoor recreation as "simply those kinds of recreation typically undertaken in the outdoors. As such, it contrasts with the various forms of recreation typically carried on indoors ... . Outdoor recreation obviously requires space and resources, for its enjoyment."[3] This study will deal solely with outdoor recreation and the physical resources on which it is based; that is the land, water, natural vegetation and wildlife which are primary attractions for outdoor recreational activities. Here then the term capability for recreation, or recreational capability arises.

In the glossary recreation use is defined as "the natural capability of land for use for any one or more of the types of recreation."[4] According to the Canadian Land Capability Classification for Outdoor Recreation, the system to be followed in this thesis, "the activities for which land capability is classified are those which are resource based and are now established as popular in the general public sense."[5] This statement sets the focus of the present study. It is devoted to an evaluation of the capability of the physical resources of Wabamun Lake and the

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[3]M. Clawson in E. H. Smith, Conservation of Natural Resources, New York, 1965, p. 442.

[4]See Appendix A.

[5]C. S. Brown, Outline of the Canadian Land Capability Classification for Outdoor Recreation, prepared for Canada Land Inventory, ARDA, Ottawa, March 1966. These activities are family bathing, snow skiing, swimming, sight seeing or viewing attractions, summer cottaging, boating, sailing, water-skiing, fishing, organized public or group camping, hunting, and canoeing; the most demanding in their resource needs, that is, intensive use of land. The following are less critical in land needs: primitive camping, gathering and collecting, ice skating, sledding, tobogganing, hiking, horseback riding, driving for pleasure, picnicking, nature walks, walking for pleasure.

eastern half of Lesser Slave Lake to support those outdoor recreational activities which are directly dependent on the resources of the natural environment.

A. Delimitation of the Study Areas

Lesser Slave Lake, the second largest lake entirely within the province of Alberta, has an area of 462 square miles. To keep the study area manageable, only the eastern half was chosen for analysis. Preliminary field reconnaissance and airphoto study indicated that this portion of the lake appeared to have the greatest recreational capability of a type or types comparable with those now developed at Wabamun Lake. Another consideration was that the eastern section is closer to Edmonton, and more accessible to the city and surrounding towns. It therefore seemed likely to provide a more valid comparison with Wabamun Lake than the much less accessible western portion.

The eastern half of Lesser Slave Lake includes all of the lakeshore and immediate backshore area east of the Narrows (Range 9, Township 74) (Figure 2). The Narrows was chosen as the dividing point, because it naturally breaks the lake into two halves.

Wabamun Lake was studied as a complete unit, because its area of 32.6 square miles created no survey problems. It is still very much smaller than the eastern half of Lesser Slave Lake. The whole of Lesser Slave Lake is 57 miles long and 24 miles at its greatest width, so that even the eastern half is 27 miles long. In contrast, Wabamun Lake is only 12 miles long and five to seven miles wide. Despite the difference in size, howeber, it was felt that a comparative study was justifiable since both lakes display physical characteristics which have recreational

significance. In other words, it was assumed that there are certain physical qualities of any lake's immediate shoreline (the presence or absence of beaches, for example), and contiguous 'backshore'[6] area, that will yield to comparison. The focus, therefore, is upon the physical characteristics of the shorelines, the places most people actually use, rather than upon features of the open water surface of the lakes themselves.

B. The Approach

During the months of July, August and the early part of September, 1966, a detailed study was undertaken of shorelines and backshore areas of the two lakes. The complete shoreline of Lesser Slave Lake was surveyed by boat, and the eastern half was mapped in detail for recreational capability. Many days were spent cruising and stopping along the lengthy shoreline. Shore areas were delineated on topographic maps at a scale of 1:50,000 or 1:63,360. A verbal description was attached to each unit which was mapped. During these field studies, water depths and offshore gradients were also measured. Frequent stops allowed backshore investigation: to examine such things as the composition of beach materials, beach size, soil characteristics, and drainage. In addition, 35 m.m. color slides were taken of each shore unit, so that a permanent objective record could be made of the different landscapes which were observed. These slides were invaluable in subsequent analysis of the field data, since they greatly improved the ability to recall the exact characteristics of each of the recreation capability units. A number of the slides have been reproduced in the thesis.

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[6]See Glossary in Appendix A.

Wherever possible, the lakeshore was also approached from the landward side, by four-wheel drive and conventional vehicles. This gave insight into the physical characteristics of the backshore and upland areas, as well as revealing the presently accessible and inaccessible areas. It was found that most of the north shore of Lesser Slave Lake falls into the latter category and was approachable only by boat. Backshore areas were studied during frequent boat landings and at various points the bush roads approached the shoreland so landward access could also be gained. The author was very fortunate in being able to fly over the entire lake and surrounding region on a pontoon-equipped Beaver aircraft. This flight gave much insight into the wilderness location of this huge expanse of water. Indeed, the aerial view rounded out the field study of the eastern half of Lesser Slave Lake, as specific beaches became locationally oriented. The feeling of remoteness is certainly manifested by the vastness of the surrounding bush. Slides taken on this flight are particularly useful as they clearly show the shoreline units, as both beach and backshore can be seen in perspective. This is particularly true in the shots of Sand Dune Beach (Plates 3 and 4) and the Muskeg Lake area (Plate 2) as relationships can be seen for the complete area (Figure 2).

In the survey of Wabamun Lake, the same procedure was followed, except that no air reconnaissance was possible. Nevertheless, a good impression of its setting had been gained from earlier flights over and about Wabamun Lake. Furthermore, as this lake is relatively small, most of its east to west length can be seen from points along the height of land on the northern littoral.

To study the factors of accessibility and demand, a questionnaire and interview technique was employed. It was thought that interviewing would be far superior to having the patron fill out the questionnaire form himself as better responses could be received. The ensuing conversations, also provided opportunities to glean additional opinions and feelings. At first it was intended that sampling techniques would be used, but it was soon found that patronage of Lesser Slave Lake beaches was so limited that every visitor could be interviewed. Indeed, in ten days of questioning over a three week period only 37 parties (totalling 172 people) were present. It must be noted, though, that only those people staying overnight at the campsites and beach locations were sampled, as this study was mainly meant to learn the opinions and demands of people from the Edmonton area. This procedure was followed to strengthen the comparison with Wabamun Lake. Nevertheless, some local residents who were spending afternoons or evenings at the lake were also interviewed so that their attitudes toward the lake could be learned. The owners of four cottages on the east end of Lesser Slave Lake were also interviewed.

In the case of Wabamun Lake a random sample technique of interviewing was followed in the Wabamun Provincial Park. Overnight campers as well as single day visitors were sampled as most of these patrons were found to be from Edmonton or its surrounding area. Questions were asked of these people so that their attitudes towards Lesser Slave Lake could be compared with Wabamun Lake patrons' attitudes towards each lake. Besides these public recreation area users, a number of cottage owners and renters along the lake were questioned. A random sampling technique

was again followed, because it was impossible to interview every cottager. Indeed, it soon became apparent that the answers generally were so similar that complete coverage was unnecessary.

Every sub-division or cottage area along the lakeshore was investigated. The number of cottagers interviewed in each unit varied from two to four. In all 75 parties were interviewed at Wabamun Lake. About half were cottagers and the remainder were local campers, picnickers or tourists. The findings of those interviewed can easily be correlated with those of Lesser Slave Lake, as a common questionnaire was used for both surveys, with only a series of supplementary questions pertaining to that particular lake being added. Indeed, the added questions dealt mainly with attitudes towards Lesser Slave Lake and its accessibility; although some questions dealt with the region of the interview. Separate questions were even added for cottagers.

C. Thesis Organization

To allow logical development of the thesis, the Canadian Land Capability Classification for Recreation is first explained and its use justified. Physical background of the eastern half of Lesser Slave Lake follows as a basis for study of the recreational capability of the area. The recreation classification described in Chapter 1 is then used in the third chapter to make the inventory of Lesser Slave Lake's eastern half. A similar study of the physical background for Wabamun Lake follows in Chapter 4 and this aids understanding of the recreational resources presented in the next: Chapter 5. Chapter 6 binds the previous recreational capability descriptions together in a comparison of the two lakes. Accessibility to each lake becomes the factor affecting its use,

especially by Edmontonians. The patronage survey provides results on use and these findings particularly suggest development plans for Lesser Slave Lake and also for Wabamun Lake. Chapter 7 presents the findings and conclusions of the thesis.

Thus, organization in this study is very straight forward. Recreational capability is described for each area then the findings are equated with accessibility and use material.

CHAPTER I

APPROACHES TO THE INTERPRETATION OF RECREATIONAL CAPABILITY

In interpreting the recreational capability of any area, whether upland or shoreland,[1] a set of criteria must be developed. Furthermore, a comparative study demands a standardized classification system. Before the physical resources of the eastern half of Lesser Slave Lake and Lake Wabamun could be evaluated, it was therefore necessary to select or devise a classification scheme which was specially oriented to recreational capability.

A comparison of recreational capability on the basis of physical attractiveness or unattractiveness is regarded as a sound approach. The extent and quality of setting and site, coupled with the carrying capacity of the area, are the major physical factors affecting capability. Man's direct influence in terms of management and accessibility can be accepted, although no allowance should be made for the possibility of human changes in the physical resource. Existing development is evaluated because it is part of the present capability, but future plans for example to dam a river or raise a lake water level, cannot be considered since they are not an established part of the resource base.

With this purpose in mind, a variety of classification systems and approaches was reviewed in an attempt to find a suitable one. They ranged from very detailed schemes which produce an excessive amount of material which is difficult to present graphically, to schemes which are very simple in both detail and illustration. It must be mentioned here that the Canadian Land Capability Classification for Outdoor Recreation[2] was finally

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[1]See Appendix A., Glossary.

[2]Prepared for Canada Land Inventory, ARDA by C. S. Brown, March 1966.

chosen for this study. However, a discussion of some of the other systems which were studied will help to clarify the reasons for the selection.

A. A Detailed Classification Scheme

An example of a very detailed classification is that devised by G. A. Hills of the Ontario Department of Lands and Forests.[3] It was his purpose to develop two use-capability scales that adequately present different degrees of detail on different scales of maps and also that present different points of view. Hills states that:

> in all capability studies land should be first classified and then ranked. In classifying land in preparation for ranking the recreation potential, the land and water areas are subdivided according to those physiographic (i.e. landform and climate) characteristics which are of general significance in recreational use ... . In order that the physiographic units established may be useful in rating land for various uses, each area is classified by a gradient or scale of effective soil and climate features (or groups of features). This is done first on a broad scale and then in increasing detail so that a hierarchical system may be set up which ranges from site regions to site phases.[4]

The first subdivision of the physiographic unit is the site region which is defined as an area, within a single landform, with the same local climate and vegetation succession. Next in the hierarchy is the landscape unit, a wide stretch of land and/or fresh water having an area of at least 16 square miles. Landscape units are distinguished from each other by

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[3]G. A. Hills, Definition of Capability Classes and Benchmark Sites for the Recreational Land Inventory, (corrected copy), unpublished report of Ontario, Department of Lands and Forests, Research Branch, Maple, Ontario, January, 1966.

[4]G. A. Hills, "Ranking the Recreational Potential of Land Units by Gradient Analysis," in Canada Land Inventory, ARDA, Proceedings National Meeting on Land Capability Classification for Outdoor Recreation, Ottawa, February, 1966, pp. 9-13.

broad differences in landform features, or by broad differences in the form of water-bodies, or by differences in the pattern of land and water areas. The final subdivision is the landscape subunit which is defined as:

> a portion of a landscape unit usually less than 16 square miles, which is of unique significance for some specific use. A subunit may be one of the components which are repetitive within the landscape unit, or it may be an "erratic" of small size which happens to fall within the unit.[5]

> In order to properly assess the capability of an area which is sufficiently large to be meaningful on a map scale of 1:250,000, it is necessary to first rank the smaller units which comprise it. Experience has shown that the most satisfactory method is to use two different scales -- one for the local site units, and another for the complex landscape units and subunits, with seven levels of capability in each.
>
> These two scales are also required to adequately express two different points of view. At the local level, the units are ranked according to their capability to support a group of activities related specifically to the features within the unit itself. At the broader level, the features of the individual units are also considered with regard to their capability to contribute variety and balance to the recreational opportunities of the whole. For example, a shoreland unit may rate low as far as bathing and camping are concerned, but if that unit has the only bathing beach and camping ground in the broad area, its presence with its low rating should not pull down but rather pull up the average of the complex ... . Each capability class indicates the level of capability, that is, the level of <u>intensity</u> or <u>quality</u> of the recreational use rather than the kind of use.[6]

From this general statement Hills goes on to outline a very detailed classification scheme which makes it possible to identify and record every conceivable variation in recreational capability at an exceedingly fine scale. It is a very complicated scheme, and at times is difficult to understand. It is also difficult to apply. A wealth of valuable material

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[5] *Loc. cit.*

[6] *Loc. cit.*

on recreational capability can be accumulated, but the more detailed and complex a classification becomes, the greater the chances for ambiguities in interpretation to occur. In many cases, the distinctions which Hills makes between capability categories and symbols are too fine to be applied with reasonable certitude. That is, the classification is so detailed that it may create as many problems in interpretation as it solves. Furthermore, the use of the Hills method produces information which is needlessly detailed for most purposes, including this thesis. As just one example of the weight of detail, even open water is subdivided into capability units. The classification of open water areas was deliberately excluded from this study, because of limitations on both time and data. Reference to Chapters 3 and 5 will show that a large amount of material was provided by the less detailed Canadian Land Capability Classification for Outdoor Recreation which was finally adopted. For example, under the Canadian Capability Classification, shore units are often less than 500 feet long, which means that the shorelands are being subdivided quite finely enough for detailed analysis and small-scale mapping. Using the Hills method, the shoreline units would have had to be subdivided much more finely still. For purposes of thesis research, then, this technique could not even be entertained, if for no other reason than that there was simply not enough time to complete a full inventory of the two study areas.

B. Simple Classification Methods.

In contrast to the complexity of G. A. Hills' system of rating recreation potential, there are several very simple and generalized schemes. Marion Clawson has classified outdoor recreation areas under

three broad headings: resource-based, intermediate, and user-oriented.[7] The resource-based areas are those centred on unusual natural qualities, such as Niagara Falls or the Columbia Icefields. In contrast, user-oriented sites are located near to where people live. The demand for them is created by a concentration of population and they must be able to satisfy this demand with maximum convenience. Neighbourhood parks and local recreation sites are typical examples. In the intermediate category, both natural attractions and convenience of location are important. An intermediate site should have water or some other attractive resource, but be no more than two hours, and preferably only one hour, away from a centre of demand. Natural qualities should dominate in the selection of intermediate sites if there is a range of attractive possibilities within a convenient travel distance.[8]

Simplicity key-notes Clawson's grouping and this is one reason against its use here. The capability units which can be identified are far too large for meaningful analysis of two lakeshores. Moreover, its economic basis makes it worthless for a detailed recreation capability study, although its rationale can be considered when demand use and accessibility are discussed for Wabamun Lake and the eastern half of Lesser Slave Lake.

G. D. Taylor has proposed a relatively simple system of inventory that would indicate the potential of rather smaller sites or areas for recreational land use. He believes that for an area to be of value for

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[7] M. Clawson, "Recreational Resources" in Guy-Harold Smith (ed.), Conservation of Natural Resources, New York, 1965, pp. 457-458.

[8] *Loc. cit.*

intensive forms of recreation, it must have an attraction. In addition to this basic need he adds four other requirements: a suitable vegetative cover, a suitable terrain or slope, an area of sufficient size for development of back-up facilities and an adequate source of drinking water.[9]

> Accessibility is not an important factor in assessing the suitability of the resources for recreation, although it will be important in deciding whether or not to develop any specific site ... .
>
> In order to evaluate these five criteria that have been defined as essential to a people intensive [sic.] recreation site, it would be possible to establish a numerical rating for each and then to sum the total of the five items. It has also been suggested that a similar result could be obtained by merely recording their presence or absence with a plus or a minus respectively; the classification would then be based on the total number of plus signs recorded for each area ... .
>
> No matter whether a numerical rating system or a simple plus or minus system is used, an area must eventually be graded on a scale that ranges from highly suitable to not suitable. Any number of terms can be used to describe the categories of the scale, but it should be possible to agree on such ones as 'highly suitable,' 'good,' 'fair,' and 'unsuitable.'[10]

Generally, G. D. Taylor's system lacks the detail required for the purposes of this thesis. The subjectivity attached to the use of adjectival descriptions of the attractions is a further disqualification. It is just not objective enough for a comparative analysis.

These three classification systems are by no means all which were studied before the Canadian Land Capability for Outdoor Recreation was chosen. There is, for example, the Check List System employed in

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[9]Gordon, D. Taylor, "An Approach to the Inventory of Recreational Lands," The Canadian Geographer, Vol. IX, 2. 1965, pp. 84-91.

[10]Loc. cit.

Saskatchewan as a provincial addition to the Canadian Land Capability Classification for Outdoor Recreation being used by the Canada Land Inventory, ARDA.[11] Other examples were a detailed classification scheme prepared by the Canadian National Parks Branch,[12] and a simpler system devised by Gordon D. Taylor and Clarke W. Thomson.[13] All, however, were discarded for the same reasons, as the schemes which have been elaborated upon.

C. The Canadian Land Capability Classification for Outdoor Recreation.

The basis of the Canadian Land Capability Classification for Outdoor Recreation is the physical quality of the landscape as an indicator of an area's probable economic potential for recreation. This is explained more fully in the following quotation:

> The most satisfactory basis on which levels of capability can be defined to cover all types of recreational features to meet the particular needs of ARDA,[14] is the intensity of use or average annual total quantity of use per unit area which could be generated under perfect market conditions[15] and sustained by an area or recreation feature.

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[11] J. H Richards, Department of Geography, University of Saskatchewan, has devised a Recreational Land Use Inventory for use in Southern Saskatchewan. This was done with cooperation of the Saskatchewan Department of Natural Resources, 1964.

[12] Canada, Department of Northern Affairs and National Resources, National Parks Branch, Basis for a Park Classification System, unpublished report, January, 1965, 20 pp.

[13] Gordon D. Taylor and Clarke W. Thomson, "Proposed Methodology for an Inventory and Classification of Land for Recreational Use," in Forestry Chronicle, June, 1966, pp. 153-159.

[14] ARDA is the abbreviation for The Agricultural Rehabilitation and Development Act which was passed in 1961 to make provision for federal-provincial programs on alternate land use, soil and water conservation, rural development, and research aimed at alleviating the primary problem of low income in rural areas. In late 1966, the title was changed to the

This is a difficult concept to express in precise terms. Yet it is the most practical basis for classifying natural capability of land to meet ARDA's need for a physical indication of the probable economic potential of land for recreation.

The considerations involved in anticipating the total quantity of annual use, a land unit could engender and sustain under perfect market conditions go well beyond available data and challenge objective measurement at this stage of recreation research in Canada. However, the knowledge gained, bolstered with published data from the U.S., enables reasonably safe comparison on this basis among various types of recreation land through reasoned analysis by experienced people.

Under perfect market conditions, a spectacular phenomenon, a superb view, an Olympic standard ski area and an extensive good bathing beach are similar enough in their power of attraction to rank in the highest capability category. Each is sufficiently unique [sic] to result in a high and comparable economic value accruing to it and to the land adjacent to it.

It is possible that a combination of two features in close proximity, but each of slightly lower quality than the best, could together attract total annual use comparable to one superior feature.

An extensive and good beach, backed by land well suited to complementary uses such as camping, hiking, riding, or lodging has a greater capability than a beach lacking such other attractions. Furthermore, an extensive beach, as the nucleus of a recreation area, would engender greater intensity of use or total use per unit of total area than would a small beach. Also, the better the beach in terms of size and quality, the larger the land unit with more or less comparable capability. Thus, both size and quality of both site and setting influence capability.

The other factor determining use capability is carrying capacity, or ability to sustain use without deterioration of the feature, or the quality of the recreation experience provided the user. Although the preferences of recreationists vary in respect to crowding in many activities, general standards of optimum use intensity by activity

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Agriculture and Rural Development Administration -- ARDA. The Recreation Inventory referred to here, is being undertaken as part of the overall Canada Land Inventory under the administration of ARDA. It is a basic phase of data collection in natural land resources, to provide information from which national rural land use planning decisions can be made.

[15]According to the Glossary attached to Appendix A, 'perfect market conditions' imply that market or demand conditions, such as location in relation to population centres, and accessibility, are equal for all areas, and therefore do not influence the relative capability of any area.

> can be defined in relation to both average user preference and to optimum physical carrying capacity of land or site under various climate, soil and cover conditions.[16]

Here, then, is the philosophy of the Canadian Land Capability recreation classification. Areas are compared on the basis of total physical resources from the special point of view of their ability to support recreation. Present uses or management factors do not affect the ratings, except that urban or industrial lands are not classified, and any existing, permanent, large-scale artificial change of the resource base is recorded as it is.

Appendix A contains the basic classification for recreation as used by the Canada Land Inventory -- ARDA. Like all the other inventories[17] being undertaken in the Canada Land Inventory program, the Recreation Classification is based upon a seven-fold class system. Class 1 comprises the highest quality areas while Class 7 lands have almost no capability for recreation. To each of the class ciphers is then added an 'S' symbol for shoreland or a 'U' symbol for upland.[18]

> Shoreland is defined as those units of land separated for classification purposes which front on a water body which is capable of supporting popular recreation activity or is large enough to do so. In practice water bodies capable of supporting family boating are considered necessary for a 'shoreland' designation to adjacent

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[16] C. S. Brown, Outline of the Canadian Land Capability Classification for Outdoor Recreation, prepared for Canada Land Inventory, ARDA, March 1966, Ottawa, pp. 2-4.

[17] The Canada Land Inventory -- ARDA is undertaking inventories of present Land Use, Land Capability for Agriculture, Land Capability for Forestry, Land Capability for Wildlife, Capability for Sport Fishing as well as the Land Capability for Outdoor Recreation -- the area of study in question here.

[18] See Glossary in Appendix A.

> land. Water bodies which are not considered large enough in terms of area (a pond or small lake) or wide enough, or too swift (as in the case of a stream or river), are considered as upland even though the dominant recreation feature (e.g. angling or canoeing may be associated with water.[19]

All other lands not fronting on a water body are classified as 'upland' and thus are given a 'U' symbol. The third element in the classification formula is a group of symbols which identify attraction features. No more than three symbols are used, but all three must be recorded as the Canada Land Inventory data is to be stored in an IBM computer. To ensure correct storage and recall it is necessary to adhere strictly to the rule of three attraction symbols in the computer input. This rule, however, has one major drawback. Many areas simply do not have enough attractions to justify the use of three symbols, and the third symbol at least may be almost meaningless. In the present study, where the procedural regions of the computer can be ignored, a third attraction symbol is added only when it is made meaningful by the area's physical capabilities.

The attraction symbols are arranged in order of significance, so that the one at the top or to the left is the major feature, and significance diminishes to the right or below in the resulting formula.[20] Thus, a capability classification would be written on the map as 3 SBNY

or 3 $\begin{matrix} B \\ SN \\ Y \end{matrix}$, depending on the shape of the recreation unit.[21]

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[19]Canada Land Inventory, ARDA, Outline with Guidelines of the Canadian Land Capability Classification for Outdoor Recreation, February, 1967, pp. 10-11.

[20]The combination of class rating and attraction features is spoken of as a 'formula'.

[21]Henceforth, the term 'unit' or 'recreation unit' refers to that area or piece of shore or upland delineated by the recreation border (Figures 5 and 11). All land within the boundary is classified as having the particular recreational capability symbolized in the formula given to it.

From such a comprehensive classification of an area, a very large amount of information on recreational capability can be gleaned. All the attractions are presented, and the numerical rating gives the quality of the resource. Recreational limitations are not specifically included, but they can be inferred from the numerical rating. In the first Canada Land Inventory Recreation Classification,[22] limitations were included as part of the classification system. However, this approach was abandoned immediately after the results of the various pilot projects were analyzed. Many problems arose from the use of limitation symbols. It was found, for example, that certain symbols were being used continually while others rarely occurred. Indeed, many of the limitation symbols became virtually meaningless. It was also found to be very difficult to apply the limitation symbols in a consistent manner in all parts of Canada. Apart from these practical difficulties there was also a conceptual weakness in attempting to classify physical limitations on recreational capability. It has already been noted that capability is to be classified according to the "intensity of use ... sustained by an area or recreation feature."[23] The classification, then, is directed at the attractiveness of a feature, not its un-attractiveness; it is a positive rather than a negative interpretation of the landscape. Only the attractions need be shown, as the interest lies in recreational capability not incapability. Thus, previous limitations shown by the pilot project interim classification such as,

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[22]Canada Land Inventory, ARDA, Classification of Land Capability for Recreation, Interim Manual to Guide Pilot Projects in 1965, Ottawa, May 1965.

[23]C. S. Brown, op. cit., March 1966, p. 2.

" 'Z' for rapids or waterfalls, a limiting factor to use"[24] are interpreted positively, so that " 'F' -- for waterfalls or rapids"[25] becomes a recreation feature or attraction.

D. <u>Reasons for Selecting the Canadian Land Capability Classification for Outdoor Recreation</u>.

The reasons for the selection of the Canadian Land Capability Classification for Outdoor Recreation fall into two categories -- the author's personal reasons, and the form of the system itself. For ease of discussion this dual breakdown will be followed.

The author's facility in using the Canadian Land Capability classification is the major personal reason for its selection. Two and one-half years employment with the Alberta branch of the Canada Land Inventory, ARDA Recreation Study has provided a considerable amount of experience, both in the office and in the field. Furthermore, the radical changes which have been made to the classification in that time provided excellent exposure to a variety of ways of interpreting recreational capability.

Besides this personal factor numerous attributes of the Canadian Land Capability Classification for Outdoor Recreation appeared to justify its choice. The fact that it was born out of the experience of many recreation researchers in Canada weighs heavily in its favour. Certainly all the experimentation in the ARDA[26] pilot project, combined with

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[24]Canada Land Inventory, ARDA, <u>op. cit.</u>, May 1965, p. 16.

[25]C. S. Brown, <u>op. cit.</u>, March 1966, p. 10.

[26]The terms "ARDA Classification," "Canadian Land Capability Classification for Outdoor Recreation" and "Canada Land Inventory, ARDA Recreation Classification," are hereafter used synonymously in this discussion.

familiarity with years of experience with similar studies in the United States, have helped this classification rank highly in the relatively short list of recreation classifications. The system is being used nationally in the study of recreational capability within Canada, so this too attests to its adequacy. Since the ARDA classification is based on an evaluation of physical resources, it is exactly suited to the purpose of this thesis. It provides a soundly conceived means of arriving at an objective assessment of the physical capability of Wabamun and Lesser Slave Lakes to support outdoor recreation. This physical capability can then be related to the actual use which is now being made of these lakes, so that conclusions can be reached about the importance of resource quality in recreational development. First though, recreation resources must be studied separately for such human factors as accessibility and demand for a true picture of their potential to be gained.

Simplicity in use as well as a relative ease in graphic presentation (Figures 6, 7, 8, 11, 12) are two further advantages in the adoption of the ARDA Recreation Classification for this thesis. It provides sufficient detail for meaningful analysis to be made, but is not so detailed that serious problems of interpretation can arise.

In the chapters to follow, the results of the application of this system will be presented in maps and text. Wabamun Lake and the eastern half of Lesser Slave Lake vary greatly in physical capability, accessibility and use, but these latter two factors will have no effect on the specific classification of each unit. Indeed, only after the physical evaluation has been fully described will the factors of road conditions and types, distance and accessibility be related to the results of the study which was part of the research project.

CHAPTER II

THE PHYSICAL QUALITIES OF THE EASTERN HALF OF LESSER SLAVE LAKE

An appreciation of the recreational potential of any area presupposes some understanding of the natural qualities of the landscape, and knowledge of such elements as surface configuration, streams, lakes and other water resources, climate, and the nature of the flora and fauna. Even the qualities of soils in a region may be an important factor in certain types of recreational developments. The purpose of this chapter is to present a general picture or setting for the eastern littoral of Lesser Slave Lake in terms of these elements and to touch briefly on their significance to its attractiveness (or unattractiveness) for recreation.

A. Surface Configuration

Lesser Slave Lake lies in a broad, relatively shallow basin between the Swan Hills[1] on the south and a highland on the north which extends from Marten Mountain to Pelican Mountain east of the lake. The lake rests on shales[2] which probably account for its black ominous colour. An embankment of drift deposited by melting glaciers in the Pleistocene, modified in the centuries since by the forces of wind and waves, extends in a crescentic pattern between these uplands. Today, it acts effectively as

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[1]The Swan Hills are reported to be an outlier of the Rocky Mountain foothills to the west. Pers. comm. A. H. Laycock, Edmonton.

[2]R. G. McConnell, Geological Survey of Canada Annual Report, Vol 5, Part I, Ottawa, 1893, p.40. The geology and landforms of the Lesser Slave Lake area have not been studied very thoroughly; although, in 1890, R. G. McConnell made this cursory report on the lake. This is the only specific discussion that could be found throughout the publications and reports of the Geological Survey, so it must be used, despite its age.

a dam, preventing the lake from draining away eastward in a broad glacial spillway (Figure 2). Although little is known definitely about the glacial history of this region, it can be imagined that a large mass of ice lying to the north and east of the Peace River, could have blocked the normal northeastward drainage. Thus, the waters of the Peace, augmented by glacial melt-waters, may well have found a circuitous route eastward through the basin of present Lesser Slave Lake, and on into the broad spillway leading southeast to the Athabasca River. When the ice finally melted, permitting the Peace to resume its pre-glacial channel, the spillway would gradually have lost its great flow. The drift embankment could then have emerged again to prevent the shallowing waters of the lake from escaping except by a small meandering, underfit stream -- the present Lesser Slave River. Whether this speculation is true or not, it is interesting to note that it has a similarity to the formation of the Gwynne channel in the Edmonton region, which temporarily served as a drainage way for the North Saskatchewan River and glacial Lake Edmonton when their passage northeastward was blocked by a wall of ice.[3]

As the lake waters dropped below the loose materials of the drift, powerful aeolian and wave action began the long and continuing process which, today, has produced a beautiful sand dune beach on the eastern end of the lake. About one hundred feet from the water's edge, one lone dune stretches for nearly two miles, broken only by an occasional blow-out. In places this dune attains heights of forty to sixty feet. Poplars and spruce up to thirty feet high, as well as willows, low bushes and bunch

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[3]Pers. comm. L. Bayrock, Research Council of Alberta, Edmonton.

Figure 2 THE LESSER SLAVE LAKE REGION

SOURCE : Dept. of Mines & Tech. Surveys 1:500,000 , 83N.E.

grasses abound on the dune itself, while the hollows of the blow-outs are in striking contrast with their nearly bare, gleaming sand. Behind this large beach dune lie several rows of parallel longitudinal dunes; low, poorly drained muskegs and muskeg lakes occupy the inter-dunal areas. Figure 5 shows the overall view of the lake's eastern half, while Figure 6 represents the sand dune[4] beach and the muskeg-dune areas behind it. Plates 1 and 2 complete the picture of the eastern extremity of Lesser Slave Lake.

It is suggested that the extreme eastern shore of Lesser Slave Lake first formed where Muskeg Lake stands today (Figure 5, the unnamed lake at 55° 20' N.L., 114° 46' W.L.). There the loose materials of the glacial drift dam holding Lesser Slave Lake, allowed development of off-shore bars which gradually caused the westward movement of the shore. Indeed, as these offshore sand bars grew, possibly on drift islands, a lagoon developed behind the bar. With subsequent filling, the lagoon was converted to a marsh area with some standing water. This process probably occurred several times, to form the present series of marshy, poorly drained areas, separated by rows of dunes built on ancient offshore bars. Today the lake front is along the large Sand Dune Beach which joins the dark shales at the base of Marten Mountain on the north, with the beds of hard yellowish sandstone alternating with sandy clays and sand at the base of the high plateau of the Swan Hills on the south side of the lake. The Lesser Slave River, the lake's outlet, meanders through this marshy eastern area, offering some drainage to what is otherwise bogland. In

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[4]To be referred to hereafter as Sand Dune Beach; the name given to it by the author.

Plate 1. The Eastern End of Lesser Slave Lake looking southeast from Marten Mountain.

Plate 2. The Muskeg Lake area and a meander of the Lesser Slave River looking north.

this muskeg, the only recreation potential is waterfowl hunting on the few lakes. Economic use is limited to a little hay pasture on artifically drained land, directly east of the town of Slave Lake, and oil exploration, which has recently enjoyed considerable success throughout the Lesser Slave Lake region.

The plateau edge of the Swan Hills parallels Lesser Slave Lake's south shore at a distance of eight to ten miles. Relatively good drainage exists in this gently rolling to hilly terrain[5] which rises some 1400 feet above the level of the lake. Shales are the lowest exposed formation of this plateau. One hundred and sixty feet of sandstones overlie these; while a very thick formation of sands, sandy clays and sandstones accounts for the top 1200 feet of strata on the northern side of the Swan Hills.[6] Several lignite seams also occur. Marten Mountain, less than one mile from the north side of the lake, appears to be similar in relief and structure to the Swan Hills.[7] Except for these two uplands areas, the land on the eastern shores of Lesser Slave Lake is generally low-lying and often marshy. This is especially noticeable along the lake's north shore where very little relief and generally flat, poorly drained terrain prevails.

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[5]A. Wynnyk et al, Exploratory Soil Survey of Alberta Map Sheets 83-O, 83-P, and 73-M, Alberta Soil Survey, Research Council of Alberta Preliminary Soil Survey Report 64-1, Edmonton, 1963, Map p. 51.

[6]The La Biche shales underlie Lesser Slave Lake and are also found near the base of the Swan Hills plateau immediately south of the lake. The sandstones are part of the Foxhill formation. The Laramie formation is the very thick horizon of sands, sandy clays and sandstones that lie on the top of the plateau and can be traced over into Marten Mountain.

[7]McConnell, op. cit., p. 40.

This brief outline indicates something of the landscape diversity that the recreationist may enjoy in the Lesser Slave Lake region. An impressive sand beach extends along the lake's eastern end, while the well-forested relief of the Swan Hills to the south and west and the upland on the northeast provide a rolling backdrop to both north and south views of the lake (Plate 3).

B. Soils

Soils are not as important to recreation as some other physical factors, although soil types and subsurface drainage can be critical to the construction of recreation facilities and to the natural development of beaches and backshores.

The eastern half of Lesser Slave Lake falls generally within the grey wooded soil zone of central and northern Alberta; degraded black soils are also found, however, in the Kinuso area south of the Narrows and in the vicinity of the town of Slave Lake.[8] Only an exploratory soil survey has been done for the Lesser Slave Lake map sheet 83-0[9], so soil knowledge is rather sketchy for the area. Nevertheless, the report contains enough detail for the purpose of this study.

The section immediately east of Sand Dune Beach along the Lesser Slave River (Figure 3), is a level to depressional area "consisting of 80 per cent moss peat bog [sic], with the remainder being sands and some gravelly outwash."[10] In addition to the moss peats, sedge peats

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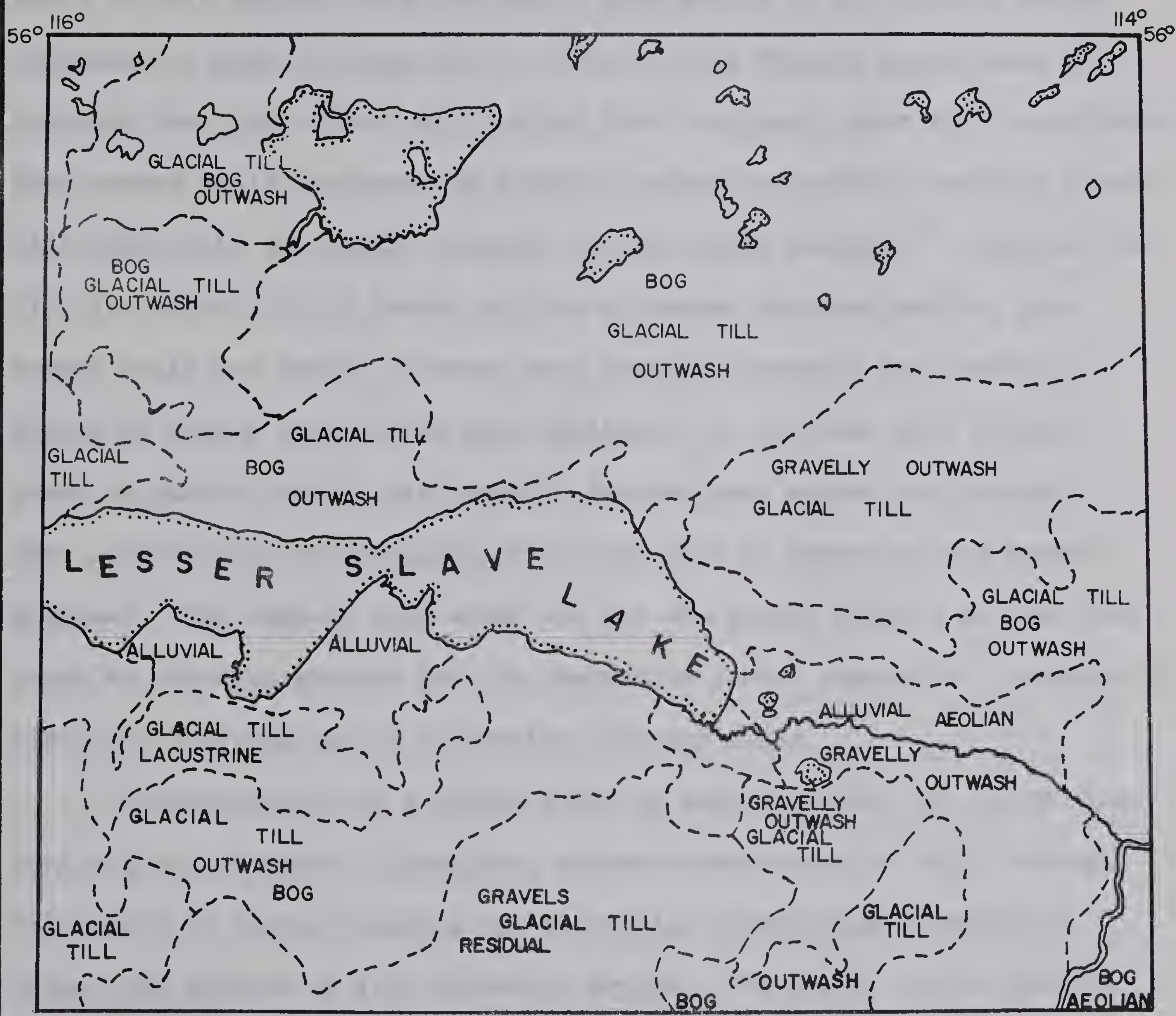
[8]J. D. Newton et al., Grey Wooded Soils and Their Management, Soil Science Department, University of Alberta, Edmonton, 1959, p. 12.

[9]Wynnyk, op. cit., p. 14.

[10]Ibid., p. 15.

Figure 3 SOIL PARENT MATERIALS



SOURCE: A. Wynnyk et al, "Exploratory Soil Survey of Alta. Map Sheet 83-O."

DIVISIONS BASED ON VARIATIONS IN PARENT MATERIALS ORDER OF LISTING INDICATES PROPORTION ACCORDING TO AREAL DISTRIBUTION.

4 3 2 1 0 4 8 16 24 MILES

and wet hayfields occur near Lesser Slave Lake in the Muskeg Lake area (Figure 5). Sand Dune Beach consists primarily of aeolian sands, while alluvial sands are more prominent along the Lesser Slave River. Mineral soils in this eastern area are mostly grey wooded of the Bisequa series developed on sand to loamy sand. Soils of this Bisequa series show more leaching than grey wooded soils which have developed under drier conditions. Grey wooded soils developed on gravelly outwash materials overlying glacial till occur with the highly leached, overly acidic podzols.[11] Wherever the till is overlain by 18 inches or less of coarse textured mantle, grey wooded soils are found. Bisequa grey wooded or podzols are located in places of deeper overlay and good drainage. It is these well drained areas of mineral soils, particularly Bisequa grey wooded and podzols, that are best for recreational facilities such as campsites and sewage disposal. The organic soil areas are wet and poorly drained so that they serve as breeding grounds for the oppressive insect population, and also limit the construction of recreation activity sites.

Transportation is a factor which is most important in the development and use of areas. Therefore, wherever roads must be built through "the bush" to distant beaches and recreation sites along streams and lakes, the problem of soil variation arises. The higher better drained, coarse mineral soils, here too, prove superior to the wet organic ones. Thus, road and highway builders look very closely at soil samples and local drainage before they begin road construction. Indeed, the question of the re-location of a five to ten miles section of the Wabasca road, which now follows Sand Dune Beach, has proven difficult for Department of

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[11] Loc. cit.

Highways officials and Provincial Parks Planning staff as the new road must follow a relatively high, well drained, easy, economical route through the dune and muskeg areas behind the beach.

A small triangular patch of potentially arable land lies on the delta of several streams on the extreme southeastern corner of Lesser Slave Lake, about the town of Slave Lake. A similar soil area has been formed on the deltas of the Driftpile and Swan Rivers. These low-lying delta areas are undulating to flat with very little horizon development in the soils but frequent layering of sandy and silty materials. Imperfect or poor drainage is common,[12] and sedge bogs are also present. Gleyed (mottled) dark grey soils occur widely on the recent alluvium, but despite their arable potential, they tend to be wet and insect infested along the lake edge. Indeed, the areas north of Kinuso, on both sides of the Narrows, and in the vicinity of the town of Slave Lake have willows and sedges to the water line. Even the presence of sandy beach patches does not permit recreational use as landward accessibility is hampered by marshes while the profuse offshore weeds and willows on the beach restrict boating and other water activities.

A one to four mile wide band of soils parallels the north shore of Lesser Slave Lake. Glacial till predominates as the parent material although areas of bog and coarse outwash materials are inter-mixed. The band continues east from the lake along the southern side of the highland which extends from Marten Mountain to Pelican Mountain. This soil zone is fairly well drained and topography is gently rolling. Mineral soils

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[12] *Ibid.*, p. 25.

here are generally grey wooded on the till, and grey wooded or Bisequa grey wooded on the shallow outwash materials.

The organic soils are mainly formed from sphagnum mosses. The large proportion of muskeg and sandy and gravelly outwash patches detract from the usefulness of the belt. Certainly, the existence of these alternating sandy and stony zones explains the long rocky north shore with its few interspersed beaches.

The final soil zone touching the eastern end of Lesser Slave Lake lies between the two deltaic or degraded black soil areas on the south shore. In that area "the parent materials are predominantly glacial till, some sandy and gravelly outwash materials, and a minor amount of bog."[13] Stones are also found in this fairly well drained, gently rolling area that stretches south-westward from Lesser Slave Lake into the Swan Hills. As in the north shore zone, grey wooded soils have developed on the till while a Bisequa grey wooded type occurs on the coarser materials overlying the till (Figure 3). Some bog areas exist such as the one in the Assineau area; however, the general presence of fine outwash materials and stony patches along this north edge of the Swan Hills, produces a good shoreline well suited for recreational facilities. Sand beaches can be found along the area although coarser materials predominate.

Thus, it can generally be concluded that the northeastern and south-central shores of the eastern half of Lesser Slave Lake have the best soils and drainage for recreation and its transportation needs.

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[13] Ibid., p. 21.

C. Climate

The Lesser Slave Lake area of north-central Alberta is located in a climatic transition zone. This area barely falls within the continental cool summer climatic zone entitled Dfb according to the Köppen classification. The "D climate" (continental climate) has an average temperature of below 26.6° F. for the coldest month while the average temperature of the warmest month is above 50°F. Furthermore, the class Dfb has a cool summer with the average temperature of the warmest month below 71.6°F. but with at least four months above 50°F. The Dfc climate has only one to three months above 50°F. so, according to the following tables, the Lesser Slave Lake areas barely attains the Dfb rating. No dry season exists in the Lesser Slave Lake area, although more precipitation is generally received in the summer half of the year (May to September). The 'f' is included in this classification, as the area has a humid continental climate and this symbol indicates no dry season. Thus from the Köppen definitions Lesser Slave Lake can be classed in the Dfb climatic zone.

It should be noted that the only accurate climatological tables of temperature and precipitation are for the Wagner, Slave Lake and Kinuso Meteorological Stations of the Department of Transport. Wagner is the only station that has complete weather data, but its records do not begin until 1951. Kinuso has precipitation figures only, and the Slake Lake station, which closed in 1962, gathered only precipitation and temperature data. Thus, Wagner, which is immediately on the lake, in contrast to the inland positions of Kinuso and Slave Lake, will form the major subject of the climatic study (Tables 1 and 2).

TABLE I

MONTHLY AND ANNUAL PRECIPITATION IN INCHES *

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Element
Wagner	Altitude, 1915 feet								Location	55°21' N.L. 114° 59' W.L.				
6	.02	.02	.03	.29	1.46	2.21	2.53	2.45	1.42	.42	.18	.10	11.13	Rain
6	8.5	9.0	5.6	5.6	0.8	T	0.0	0.0	0.6	4.8	8.9	10.6	54.4	Snow
6	.87	.92	.59	.85	1.54	2.21	2.53	2.45	1.48	.90	1.07	1.16	16.57	Ppt.
Slave Lake	Altitude, 1920 feet								Location	55° 17' N.L. 114° 46' W.L.				
1	.05	T	.07	.40	1.65	2.60	3.02	2.55	1.65	.58	.14	.01	12.72	Rain
1	9.0	9.1	7.6	4.5	0.6	0.0	0.0	0.0	9.5	5.7	9.1	9.9	56.0	Snow
1	.95	.91	.83	.85	1.71	2.60	3.02	2.55	1.70	1.15	1.05	1.00	18.32	Ppt.
Kinuso	Altitude, 1931 feet								Location	55° 19' N.L. 115° 25' W.L.				
6	.02	.00	.02	.53	1.64	2.97	3.09	2.30	1.77	.58	.25	.17	13.34	Rain
6	11.9	8.0	8.1	5.8	0.6	0.0	0.0	0.0	0.6	3.7	10.0	7.1	55.8	Snow
6	1.21	.80	.83	1.11	1.70	2.97	3.09	2.30	1.83	.95	1.25	.88	18.92	Ppt.

EXPLANATION:

Element in Table 1, gives the precipitation form, that is, rain, snow or total precipitation respectively.

The "Period" code for this table is:

1 -- Normals computed directly from a period of record of 25 to 30 years within the period 1931-1960. In most cases the record existed over the full 30 years.

3 -- Data for these normals were from the full ten-year period 1951-1960 adjusted to the standard normal period 1931-1960.

6 -- These averages are based on the period of record of 10 to 24 years during the period 1931 to 1960. No adjustment factor has been used.

*Climatology Division, Meteorological Branch, Precipitation Normals for Alberta, Toronto, 1965.

TABLE II

MONTHLY AND ANNUAL AVERAGES OF TEMPERATURE (^{o}F)*

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Element
Wagner														
3	3.1	8.6	19.4	35.5	48.0	54.5	60.5	57.4	49.0	38.9	23.3	9.6	34.0	Mean
3	11.7	18.9	37.8	46.0	60.0	64.9	70.8	67.7	58.6	48.0	31.3	18.3	43.8	Max.
3	-5.5	-1.7	1.0	25.0	36.0	44.1	50.2	47.1	39.4	29.8	15.3	0.9	24.2	Min.
Slave Lake														
1	1.7	7.3	19.8	36.9	49.1	55.3	60.6	57.6	49.1	38.5	21.7	7.9	33.8	Mean
1	11.2	18.5	31.6	49.0	62.2	67.2	72.8	69.8	60.5	48.7	29.7	16.3	44.8	Max.
1	-7.8	-.39	8.0	24.7	36.0	43.3	48.4	45.3	37.6	28.2	13.6	-0.5	22.7	Min.

EXPLANATION:
"Element" in Table II refers to mean monthly temperature, maximum monthly temperature, and minimum monthly temperature respectively.

The "Period" code for this Table is:
1 -- Normals computed directly from a period of record of 25 to 30 years within the period 1931-1960. In most cases the record existed over the full 30 years.
3 -- Data for these normals were from the full ten-year period 1951-1960 adjusted to the standard normal period 1931-1960.
6 -- These averages are based on the period of record of 10 to 24 years during the period 1931 to 1960. No adjustment factor has been used.

*Climatology Division, Meteorological Branch, Temperature Normals for Alberta, Toronto, 1964.

Wagner is located approximately ten miles west of the eastern extremity of Lesser Slave Lake, and the station is situated on the south shore of the lake within 100 yards of the water. The station site is just 23 feet above mean lake level, so there is no doubt a moderating effect brought on by the large body of water. This effect is lost during the lake's frozen period, and the winter ice probably has a negative effect. The open expanses of ice increase wind fetch which, in turn, lowers the sensible temperature through wind chill. Cold northeast winds fetch across a wide open area of ice as Wagner is near the lake's widest point. The north and east winds associated with arctic high pressure centres so common in winter, are relatively infrequent in summer. Indeed, summer winds originate more in the west and southwest so that the nearby Swan Hills protect the Wagner station. Nevertheless, the low relief along the western half of Lesser Slave Lake permits winds to sweep across the open water. Fifty-seven miles of lake lie between the western and eastern shores, so that strong gusts and driving force are generated over this unobstructed distance.[14] These winds are particularly notable along the long northeastern shore north of the town of Slave Lake. Here, many years of onshore winds and waves have built numerous sand beaches for which Lesser Slave Lake is becoming known. Sand Dune Beach is largely due to the strong west and southwest winds which produce the waves that constantly hit the northwestern shoreline. Through many decades of building, these waves have formed the beach from an offshore bar, leaving only a partially filled marshy lagoon behind the completed

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[14] Very limited meteorological data on wind direction and velocity exists for the Lesser Slave Lake area. Only Wagner records these figures, and as wind varies with every locality, a Wagner summary would be meaningless. Furthermore, such yearly averages are difficult to represent so that for the purposes of the paper this discussion must suffice.

dune zone.

Climate also plays a very important role in man's direct use of Lesser Slave Lake's waters. The lake waters have a relatively low temperature in summer, and this is detrimental to deep water swimming and water skiing. Nevertheless, along most of the long, gently dipping sand beaches on the eastern end of the lake, waters are greatly warmed by solar heat. At this latitude (the center of the lake lies at latitude 55° 25' north) June 21st has more than 18 hours of sunshine. Thus, the sun has an opportunity to warm the shallow beach zone waters. In mid-July, 1966, water temperatures were recorded along Sand Dune Beach directly north of Slave Lake townsite, and these ranged from 68 F. to 71 F. out to a depth of four feet; they also varied with cloud cover from day to day. Similar temperatures were recorded by R. B. Miller in 1941, and these are presented in Table III. Map 4 shows the submarine contours of Lesser Slave Lake, so that the gentle basin-like shape of this water body can be appreciated. Miller states in his 1941 report (and it can also be seen from Table III) that Lesser Slave's water is well mixed and no water temperature stratification exists.[15] The greatest recorded depth is 65 feet in the eastern half of the lake; the shallower western end has a maximum of only 41 feet. In addition to being shallow, the gentle gradient of the lake basin affords great expanses of shallow water along the shores, while the long east-west expanse of water (57 miles), allows the westerly winds to build large waves. Indeed, ten feet waves are not unusual on the lake so that fishing and boating in small craft are dangerous, even

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[15] R. B. Miller, The Lesser Slave Lake Investigation, 1941, Publication of the Department of Zoology, University of Alberta, Edmonton, 1941, p. 26.

TABLE III

TEMPERATURES AT VARYING DEPTHS IN LESSER SLAVE LAKE

	East End									West End	
	May	June			July				August	June	August
Depth (feet)	29	11	18	26	5	13	20	28	5	28	5
0	47	59	58	58	69	65	71	65	63	62	66
5		54	66	65							
10	45	54		58	64	65		64			
15											
20				58	62	65					
30					59	65	68	60			
40				54	54	62	68	60		59	63
50						56					
60	44	50	52	49	52	54	55	60	60		

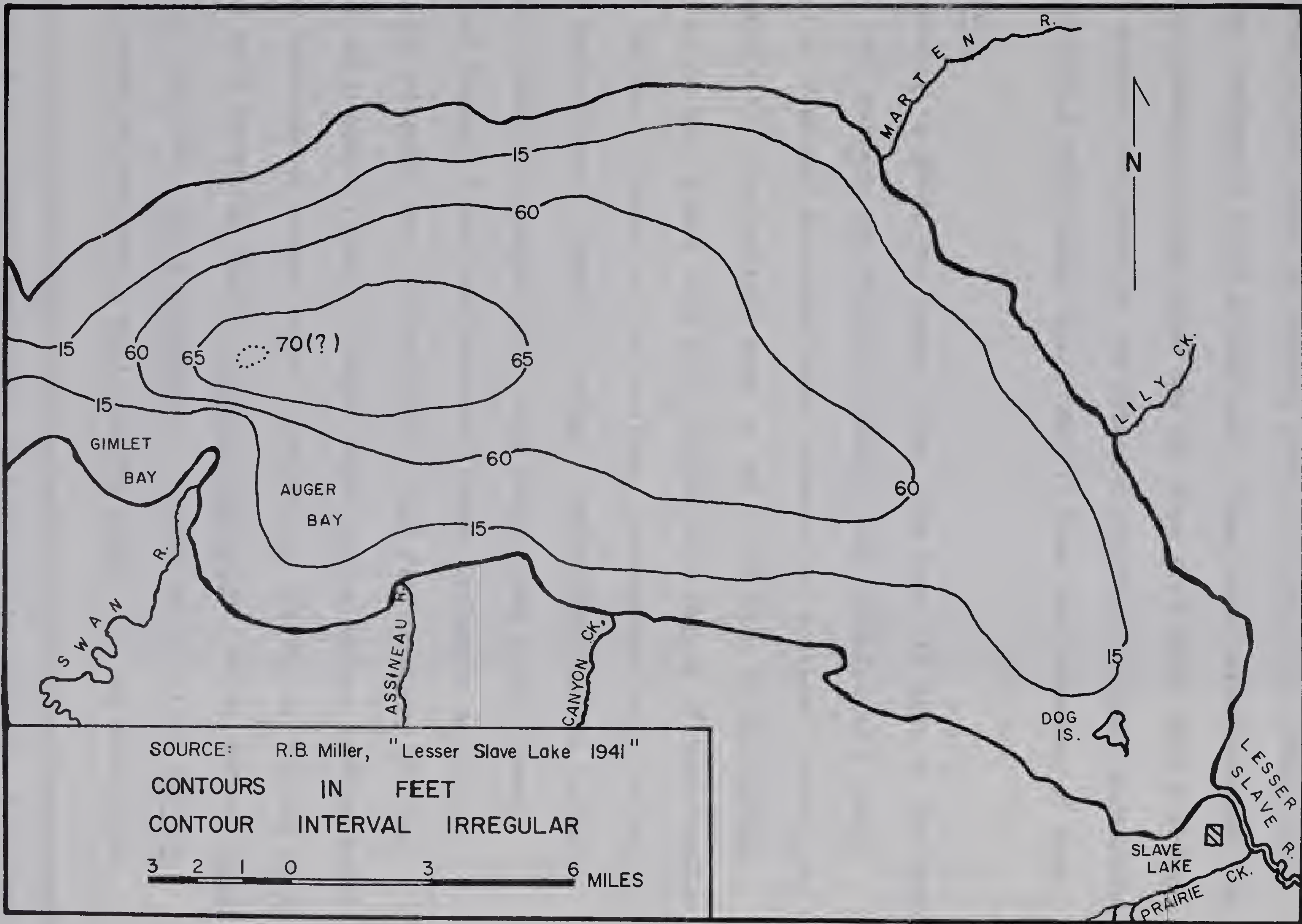
Source: R. B. Miller, The Lesser Slave Lake Investigation, 1941, Publication of the Department of Zoology, University of Alberta, Edmonton, 1941, p. 26.

relatively near the shore. The rough surface of the lake, coupled with the relatively shallow symmetrical basin, provides for thorough mixing of water and a general uniformity in water temperature throughout. Conversely, surface waters tend to be cooled by these frequent stirrings, so that, despite the warming tendency of the sun's rays, the lake remains slightly cold for swimming. Indeed, Table 3 records only two days with water temperatures at the surface above 68°F, the temperature below which swimming and water play is uncomfortable. Sixty-eight degrees fahrenheit is not a fixed minimum, as solar radiation, winds and air temperature can overcome slightly lower temperatures. Nevertheless, 71°F. was the highest temperature noted by Miller in 1941, and this was higher than any temperature recorded in July 1966. 61.8°F was the average surface water temperature recorded by Miller for the eastern end of Lesser Slave Lake in the period May 29 to August 5, 1941, and this average is definitely too low for good swimming and water activities. It must be remembered that this surface temperature was taken in deep, offshore water where the mixing and cooling effects would be most prominent. The shallower zones along the shoreline would be somewhat warmer as solar heat could penetrate nearly to the bottom, particularly in the zero to five feet zone along the long sandy beaches. Indeed, it is in the warmed shallow zone on these beaches that water activities are most pleasant.

Normal cloud statistics are available for Wagner so we can gain an idea of this area's sunshine receipt[16] (see Table 4). Cloudless skies are not as common at this lake as they are over much of the northern Great

[16]No hours of bright sunshine are recorded for Wagner, so cloud cover data must suffice.

Figure 4 SUB-MARINE CONTOUR MAP OF LESSER SLAVE LAKE'S EASTERN HALF



Plains. Indeed, this expanse of water provides a moisture source for cloud generation, and also the near-by Swan Hills south of Lesser Slave Lake, allows orographic cloud production. Thus, on an average summer day, large billowy cumulus clouds cross the sky over this lake. Such a summer sky is not unusual over most of the Canadian interior although more cloud generally prevails about large lakes than it does over expanses of land.

D. Vegetation

According to Moss, the Lesser Slave Lake area "is part of the broad transition belt between the Northern (Boreal) and Cordilleran forests. It may also be regarded as transitional between the northern forest zone and the prairie."[17] The deltaic area on the south side of the Narrows now exists as an open plain with only intermittent groves of aspen poplar. Most of it has been cleared of its conifers, interspersed with deciduous forms, for agriculture. Generally though, Lesser Slave Lake's eastern half is quite densely forested, with only small areas of settlement present along Highway 2 and the Northern Alberta Railway's mainline. Settlement and clearing are centred around each small railway station. Beyond this development rises the mixed aspen poplar-spruce forests which extend over hundreds of square miles. Generally, the better drained areas are covered with trembling aspen (Populus tremloides), white spruce (Picea glauca), and jack pine (Pinus banksiana). Periodically, birch (Betula papyrifera) grows on moderately well drained sites. In the Swan Hills,

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[17] E. H. Moss, Forest Communities in Northwestern Alberta, Collected Papers on the Vegetation of Northwestern Alberta, reprinted from Canadian Journal of Botany, 31, March 1953, pp. 212-252.

south of Lesser Slave Lake, lodgepole pine (Pinus lasiocarpa) abound. The Research Council of Alberta found in their exploratory soil survey of the area, that aspen and white spruce predominate in the southern and western portions of the Lesser Slave Lake area, on medium to fine textured soils, while jack pine and aspen are more common in the sandy soils, especially northeast of the lake.[18]

In this same soil report, it is indicated that the poorly drained localities are usually occupied by moss bogs (muskegs) with black spruce (Picea mariana) and Labrador tea (Ledum groenlandicum) making up the tree and ground cover. Immediately to the southeast of Lesser Slave Lake an extensive area of sedge and marsh reedgrass (Calamogrostis canadensis) and in some instances dwarf birch (Betual glandulose) and willow (Salix), comprise the vegetative cover. The dwarf birch and willow are particularly evident above the storm beach line on most of the sandier beaches of the lake. In the summer of 1966, water levels were relatively high so that open beach available for recreation was limited by the presence of these bushes. They also restricted direct accessibility to the water for boats, swimmers, and fishermen. The beaches directly below the Marten River campsite and the south end of the Sand Dune Beach provide excellent examples of recreational difficulties brought on by vegetation (see Plate 4). The heavy profusion of water weeds, particularly in Auger Bay, throughout the bay west of Swan Point, and in the extreme southeastern corner of the lake also hamper recreational activities (refer to Figure 2). In the mid to late part of summer, these weeds become so dense that power boating is almost impossible along most of the shoreline. Swimming is

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[18] Wynnyk, op. cit., pp. 13-14.

Plate 3. Sand Dune Beach, Class 1 SBYN looking south.

Plate 4. Sand Dune Beach and backshore from an aircraft.

unattractive if not dangerous, and can rarely be undertaken from anchored boats even if the cool offshore waters could be braved.

Vegetation has a major role in the recreational potential of an area, whether as a positive or a negative factor. The vast mixed forests of the Lesser Slave area provide a luxuriant backdrop to the lake itself, as well as providing shade and furnishings to the beach backshores, campsites and even the otherwise barren swamps and marshes. Negatively, vegetation reduces usable beach during high water periods while weeds create problems in shallow water zones. Nevertheless, the recreational advantages of vegetation are much greater as many of the problems can be alleviated by cutting and clearing.

E. Fauna

The region about the eastern half of Lesser Slave Lake can generally be classified as wilderness, despite the narrow band of settlement that runs along the south shore of the lake. Indeed, this relatively uninhabited region is part of the wilderness zone that links the Swan Hills with Northern Alberta, and it therefore has a substantial faunal population. Moose, deer and bear comprise the major percentage of the quadraped group, and according to the Province of Alberta Fish and Wildlife Division, the moose numbers are so great that they offer a chance for widespread hunting during the season. It was even suggested that moose hunting might offer some of the local Slave Lakers the possibility of employment as guides. Eben Ebenau, one of Alberta's Rocky Mountain

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[19]Pers. comm. G. H. Haugan, Fish and Wildlife Division, Fisheries Biologist, Edmonton.

guides, makes his home on the northeast shore of Lesser Slave Lake. A few decades ago, this was a centre for guiding hunters in the Swan Hills to the south and also the wilderness to the north. Today the petroleum industry has disrupted the hunting activities somewhat, so that the big game hunter must go to the Rockies if he is to bag prize trophies. Nevertheless, hunting of moose, deer and bear is good in the Lesser Slave region as Fish and Wildlife Regulations and hunting seasons protect the various animals. Grizzly bear are also found in the nearby Swan Hills although their recent scarcity has brought the removal of hunting privileges.

Ducks and geese are present particularly along Lesser Slave Lake's more marshy and protected shores, and they also inhabit Mitsue Lake, the small pot-holes and the muskeg lakes directly east of Sand Dune Beach. Pelican colonies exist on Swan Point and the southern Narrows Point and, as this bird is relatively scarce within the province, Fish and Wildlife officials are attempting to protect it and its habitat so that pelican numbers will be increased.[20]

Fishing in Lesser Slave Lake is particularly good, as the presence of a commercial fishery testifies. Tullibee (Leucichthys sp.) is now the major commercially sought fish as Lake Whitefish (Coregonus clupeaformis) has declined due to environmental change and fishing pressure. Commercial fishing has also been a principal factor in the growth of mink ranching along the lake's southern shore. Besides the two commercial species, many more

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[20]Pers. comm. Dennis Forsythe, Slave Lake District Fish and Wildlife officer for Alberta Government, Canyon Creek.

good sport fish abound. The main species are Rocky Mountain whitefish (Prosopium sp.), Arctic grayling (Thymallus signifer), goldeye (Amphiodon alosoides), ling (Lota maculosa), trout-perch (Percopsis omiscomaycus), pike, jackfish (Esox lucius), perch (Perca flavescens) and yellow pickerel (Stizostedion vitreum).[21] Lake trout were abundant in the early part of this century but are now almost non-existent.

One great difficulty faces fishing, and particularly sport fishing, in Lesser Slave Lake. This is the size of the lake which, associated with its capricious winds, creates a large and treacherous wave action. Indeed, the author experienced waves ten feet high within 200 yards of the north shore, and on calm days rough waters could develop within minutes. Thus, small angling boats are definitely unsafe on the lake, and for this reason most sport fishing is done from shore. Moreover, Lesser Slave's notoriety has spread so that avid fishermen now go elsewhere to less dangerous waters. Fawcett Lake, northeast of Smith is one such lake which has attracted many of the Edmonton anglers who come to the Lesser Slave region. Marten River is the only stream in the Lesser Slave Lake locality that was mentioned by locals as a good grayling stream, although the Lesser Slave River particularly near the lake outlet attracts Slave Lake townspeople. The Lesser Slave River is not particularly good for fishing, although many of the lake fish get into the outlet area and thus provide recreation for the seemingly captive audience of petroleum workers who are stationed at the town.

Thus, fishing in Lesser Slave Lake is generally good, although

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[21] R. B. Miller, op. cit., pp. 6-7.

TABLE IV

NORMAL CLOUD STATISTICS*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
Wagner	6.1	6.1	6.0	6.1	6.2	6.6	6.2	5.8	6.1	6.0	6.6	5.4	6.1	MC
10-16 years	32%	32	31	29	28	21	25	29	29	30	26	30	29	FC
(period 1941-	12%	12	16	18	20	24	26	25	19	19	14	14	18	FM
1960)	56%	56	53	53	52	55	49	46	52	51	60	56	53	FO

EXPLANATION:

Monthly and annual mean cloud amounts and the percentage frequency of cloudiness in the ranges of 0 to 2 tenths, 3 to 7 tenths and 8 to 10 tenths for period 1941-1960.

The values listed are generally based on at least ten years of observed data.

The mean cloud amounts are expressed as tenths of the total sky covered, and indicated by the letters MC in the column farthest to the right.

FC = percentage frequency of 0 - 2 tenths.

FM = 3 - 7 tenths.

FO = 8 - 10 tenths.

*Climatology Division, Meteorology Branch, Dept. of Transport, Normal Cloud Statistics, Toronto, 1965.

the 'sea-like' nature of the lake demands larger boats for commercial fishermen and limits the angler or sport fishermen.

CHAPTER III

THE RECREATIONAL CAPABILITY OF THE EASTERN HALF OF LESSER SLAVE LAKE

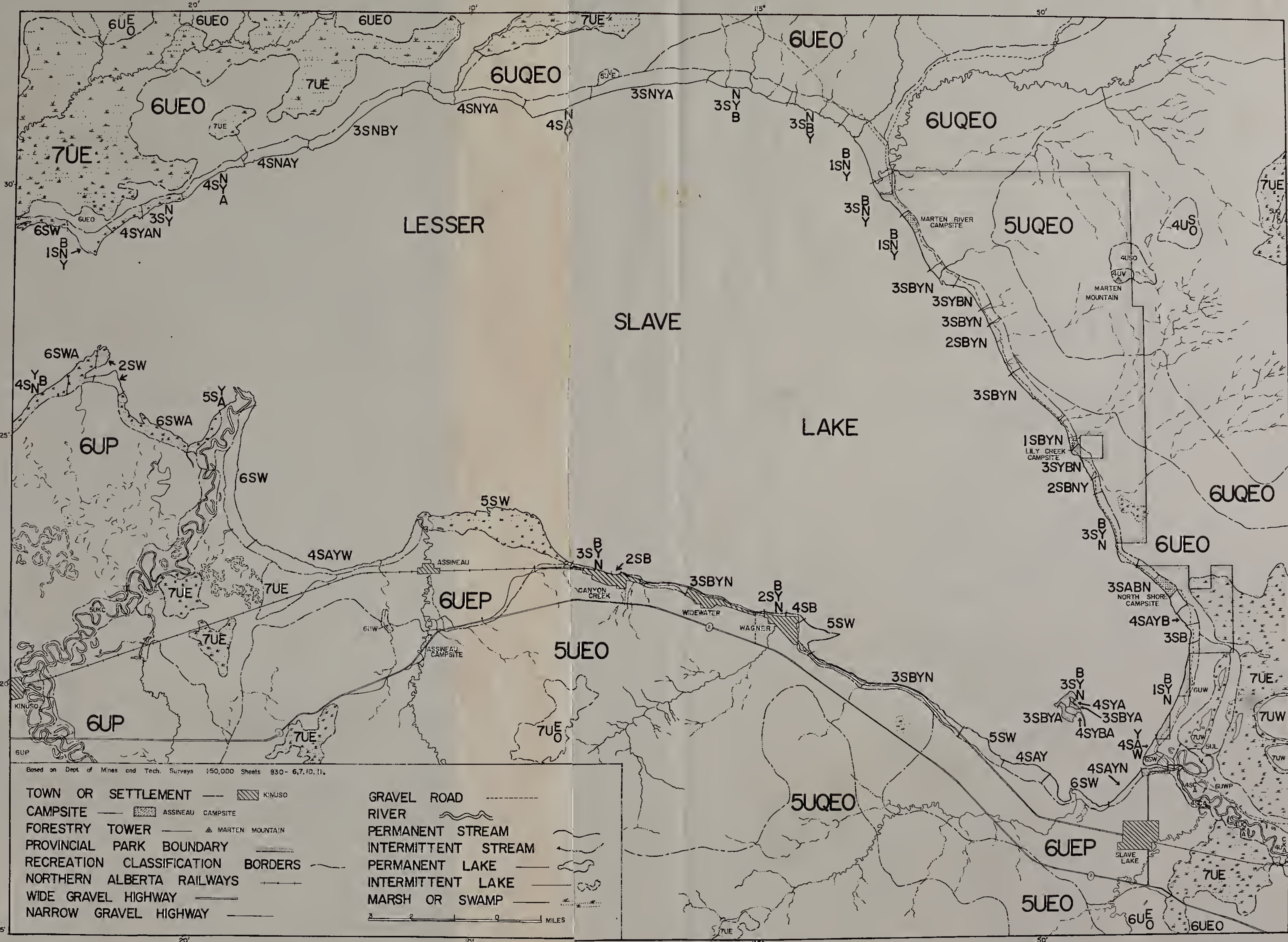
The region of the eastern half of Lesser Slave Lake exhibits considerable diversity in its recreational potential. This is particularly true of the shorelands. Indeed, five of Alberta's relatively scarce Class 1 beaches lie within the study area while a series of lower rated units are also found.

The recreational capability of the complete eastern half of Lesser Slave Lake, as well as some of the surrounding area, is presented in detail in Figure 5. It is not intended, however, that each capability unit should be described in the text. Two additional maps (Figures 6 and 7) are larger-scale versions of two very different sections of shoreland which have been selected as sample studies. These comprise the extreme southeastern corner of the lake and the area about the Narrows. They embrace a representative selection of the capability units which are found on Lesser Slave Lake, and therefore give an acceptable picture of the diversity of its recreational potential. In the sample studies, each capability unit is discussed in turn. Photographs are also provided as supplementary illustration. If desired, the information provided by these means can be used to interpret the physical qualities of units with comparable classifications elsewhere in the lakeshore.

A. General Review

Figure 5 presents an overall view of the physical capability for recreation of Lesser Slave Lake's eastern half. From it, it can be seen that Sand Dune Beach is the largest Class 1 beach within the map area.

Figure 5 RECREATIONAL CAPABILITY



EXPLANATION TO ACCOMPANY FIGURES 5, 6, 7,

-- THE EASTERN HALF OF LESSER SLAVE LAKE

Class 1 - areas in this class have a Very High Capability for outdoor recreation.

1 SBNY - Class 1 Shoreland with capability for bathing, cottage use and boating to a lesser extent.

1 SBYN - Class 1 Shoreland with capability for bathing, boating and cottage use to a lesser extent.

1 SNBY - Class 1 Shoreland with capability for cottage use, bathing and boating to a lesser extent.

1 SYBN - Class 1 Shoreland with capability for boating, bathing and cottaging to a lesser extent

Class 2 - areas in this class have a High Capability for outdoor recreation.

2 SB - Class 2 Shoreland with capability only for bathing.

2 SBNY - Class 2 Shoreland with capability for bathing, cottaging and boating to a lesser degree.

2 SBYN - Class 2 Shoreland with capability for bathing, boating and cottaging to a minor degree.

2 SW - Class 2 Shoreland with potential for wetland wildlife viewing and hunting.

2 SYBN - Class 2 Shoreland with capability for boating, bathing and cottage use to a lesser extent.

Class 3 - areas in this class have a Moderately High Natural Capability for outdoor recreation.

3 SABN - Class 3 Shoreland with capability for angling, bathing and cottage use to a minor extent.

3 SB - Class 3 Shoreland suited only to bathing.

3 SBNY - Class 3 Shoreland with capability for bathing, cottage use and lastly boating.

3 SBYA - Class 3 Shoreland with capability for bathing, boating and lastly angling.

3 SBYN - Class 3 Shoreland with capability for bathing, boating and cottage use to a lesser extent.

3 SNBY - Class 3 Shoreland with capability for cottage use, bathing and boating respectively.

3 SNY - Class 3 Shoreland with capability for cottage use and boating to a lesser extent.

3 SNYA - Class 3 Shoreland with capability for cottage use, boating and angling respectively.

3 SYBN - Class 3 Shoreland with capability for boating, bathing and lastly cottage use.

3 SYNB - Class 3 Shoreland with capability for boating, cottage use and bathing to a lesser extent.

3 SNYB - Class 3 Shoreland with capability for cottage use, boating and bathing respectively.

<u>Class 4</u> - Areas in this class have a Moderate Capability for outdoor recreation.

4 SAY - Class 4 Shoreland with capability for angling and boating.

4 SAYN - Class 4 Shoreland with capability for angling, boating and lastly cottage use.

4 SAYB - Class 4 Shoreland with capability for angling, boating and bathing to a lesser extent.

4 SAYW - Class 4 Shoreland with capability for angling, boating and wetland wildlife hunting and viewing.

4 SB - Class 4 Shoreland with capability for bathing only.

4 SNAY - Class 4 Shoreland with capability for cottage use, angling and boating to a lesser degree.

4 SNYA - Class 4 Shoreland with capability for cottage use, boating and lastly angling.

4 SNYB - Class 4 Shoreland with capability for cottage use, boating and bathing to a lesser extent.

4 SYA - Class 4 Shoreland with capability for boating and angling only.

4 SYAN - Class 4 Shoreland with capability for boating, angling and cottage use respectively.

4 SYAW - Class 4 Shoreland with capability for boating, angling and wetland wildlife hunting and viewing to a lesser extent.

4 SYBN - Class 4 Shoreland with capability for boating, bathing and lastly cottage use.

4 SYBA - Class 4 Shoreland with capability for boating, bathing and angling to a lesser extent.

4 USO - Class 4 Upland with capability for skiing and upland wildlife hunting and viewing.

4 UV - Class 4 Upland with capability for viewing.

4 UCKA - Class 4 Upland with capability for canoeing, camping-picnicking and angling.

4 SCA - Class 4 Shoreland with capability for canoeing and angling

Class 5 - areas in this class have a Moderately Low Capability for outdoor recreation.

5 SW - Class 5 Shoreland with capability for wetland wildlife viewing and hunting.

5 SYA - Class 5 Shoreland with capability for boating and angling.

5 UEO - Class 5 Upland with tree cover and capability for upland wildlife hunting and viewing.

5 UQEO - Class 5 Upland with a diversity of landscape, tree cover, and capability for upland wildlife hunting and viewing.

5 UKC - Class 5 Upland with capability for camping-picnicking and canoeing.

5 UVE - Class 5 Upland with viewing capability and a tree cover.

5 UL - Class 5 Upland with an interesting landform feature.

Class 6 - areas in this class have a Low Capability for outdoor recreation.

6 SW - Class 6 Shoreland with capability for wetland wildlife hunting and viewing.

6 SWA - Class 6 Shoreland with capability for wetland wildlife hunting and viewing, and angling.

6 UEO - Class 6 Upland with tree cover and capability for upland wildlife hunting and viewing.

6 UEP - Class 6 Upland in transition, with tree cover and some cultural development

6 UEO - Class 6 Upland with tree cover and a capability for upland wildlife hunting and viewing.

6 UP - Class 6 Upland culturally developed.

6 UQEO - Class 6 Upland with diversity of landscape, tree cover and capability for upland wildlife hunting and viewing.

6 UW - Class 6 Upland with capability for wetland wildlife hunting and viewing.

Class 7 - areas in this class have a Very Low Capability for outdoor recreation.

7 UE - Class 7 Upland with tree cover.

7 UW - Class 7 Upland with some capability for wetland wildlife hunting and viewing.

Other smaller Class 1 beaches occur elsewhere on the northeastern shore, and there are also several stretches of Class 2 shoreland. Over the whole study area, however, Class 3 and Class 4 beaches are most numerous. Class 7 shoreland is not present on the eastern half of Lesser Slave Lake despite the fact that many large marsh and muskeg areas reach the water's edge. Such areas are raised to Class 5 or Class 6 just by their proximity to a quality lake, as well as by the presence of wetland wildlife. The southern side of the Narrows is a unique case of a marshy shore raised to a Class 2 because of the presence of a pelican colony.

Upland classification of the area immediately around the eastern half of Lesser Slave Lake is not as diversified as the shoreland. Generally, the Swan Hills plateau and the Marten Mountain areas are placed in Class 5, since they have varied relief, numerous small water bodies and streams, and an aesthetically pleasing mixed vegetation cover. The northeastern side of Marten Mountain, and the area about the Alberta Forest Services Fire Lookout Tower, are both rated as Class 4 as they are unique within the locality. The tower vicinity commands an impressive view of the lake's 57 mile expanse, and especially the extreme eastern end (Plate 1). The northeastern slope is rated highly because of its skiing potential (Figure 5). The lower flanks of these hilly areas gain only a Class 6 as they are flat to undulating in nature. The low deltas about Slave Lake and Kinuso are featureless agricultural or forest areas so they deserve no more than a 6 category. Muskeg areas east of Sand Dune Beach and along the extreme northwestern shore have a minimal recreational capability, and so are ranked as Class 7. These areas are almost useless for recreation although some wetland wildlife hunting

potential exists.

B. The Extreme Southeast Corner of Lesser Slave Lake (Figure 6)

For ease of presentation, this description begins at the North Shore campsite of Lesser Slave Lake Provincial Park and proceeds clockwise along the shoreline. Plate 6 shows the storm beach in front of this well-forested, generally flat campsite. Bands of sand and sandy clay are interspersed with pebbles and stones which range between one and six inches in diameter. As a result, the beach has a mediocre capability for bathing. Furthermore the underwater gradient is relatively steep, with a drop of five feet in a distance of only thirty feet. Therefore, as the 3 SABN classification indicates, bathing (B) is not the major attraction. Shore-based angling, on the other hand, is particularly good since the occurrence of heavy offshore weeds is both an attraction to perch and pike and a deterrent to swimming and motor boating. The stones along the water's edge are a serious problem to small craft launching and docking and for this reason the capability for family boating (Y) was omitted from the rating.

The backshore of the North Shore campsite is most attractive, both in the gentle fifteen feet rise from the dry beach[1] to the flat campsite area, and in the mixture of vegetation cover. Access is readily provided by the Wabasca road which skirts the campsite. Fortunately, too, the ever-present dust on this road does not affect the campground as the stands of trees screen the tent and picnic sites. The trees also protect the campsite from summer onshore winds which roughen the close-in water

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[1]See Appendix A.

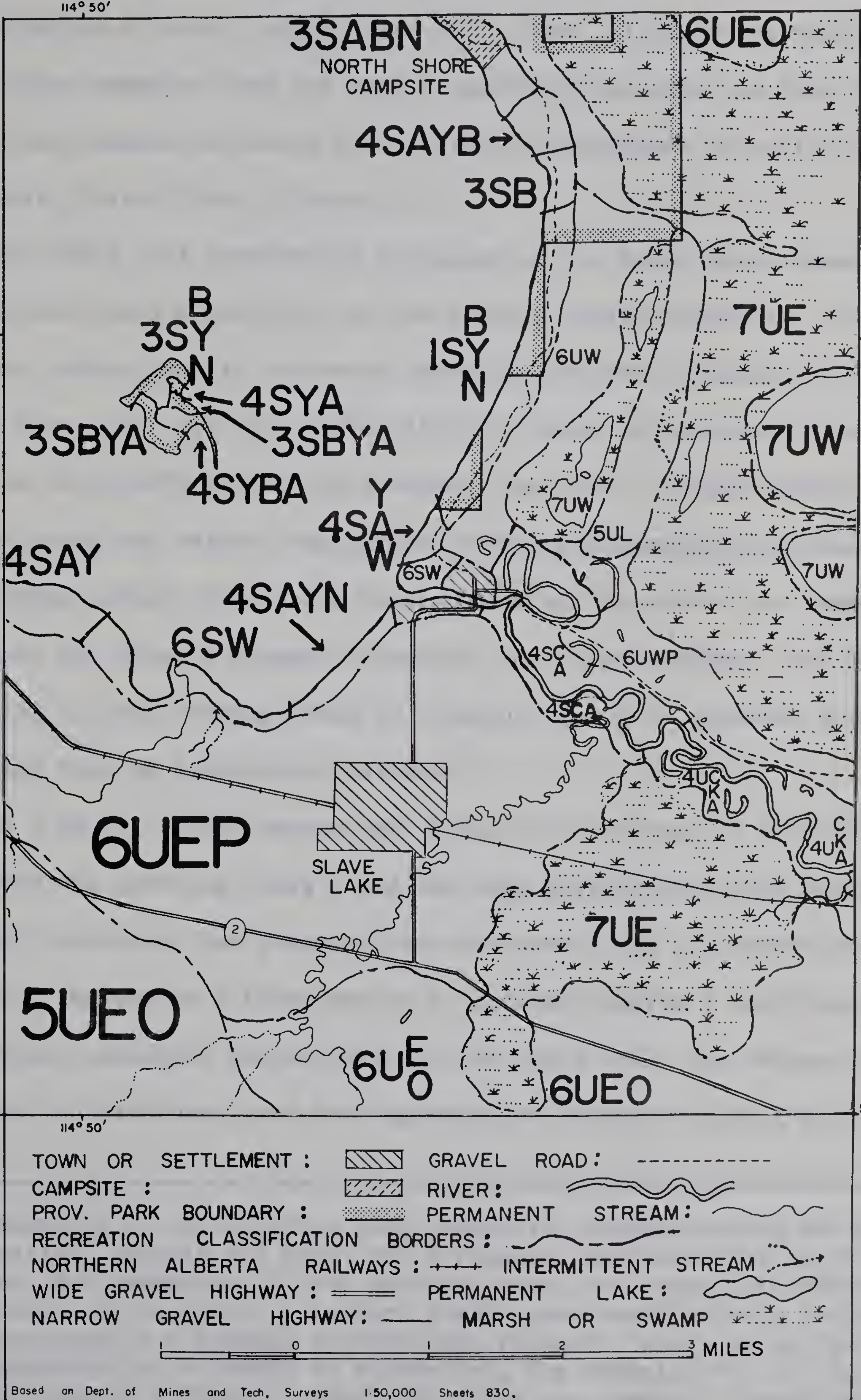

Figure 6 RECREATIONAL CAPABILITY of Lesser Slave Lake's Extreme S.E. Corner.

and detract from beach activities. The unit is therefore attractive for family cottaging or other lodging uses (N). Thus, although the beach area at North Shore campsite does not have a capability as great as that of several other beaches on Lesser Slave Lake, the backshore potential is as good as most (Plate 6) and (Figure 5).

The 4 SAYB unit immediately southeast of the North Shore campsite has poorer shoreland capability, as the Class 4 rating indicates. Weeds, willows and rushes grow in the water directly offshore, although as is often the case, they are also indicative of a sandy bottom and dry beach. Drainage is relatively poor in this narrow, low unit. Slight clearing of vegetation along the water's edge allows boating accessibility,although offshore weeds detract from power boating here as they do at the campsite unit. Since the Class 4 category displays these disadvantages, the angling (A), boating (Y) and bathing beach (B) symbols are to be regarded more as descriptions than as attraction features.[2]

The 3 SB unit which occurs next along the shoreline is a transition unit between the previous Class 4 and the high quality Sand Dune Beach. This Class 3 shoreland has good quality white sand, but its capability is reduced by excessive willows and by a tendency towards a low-lying, poorly drained backshore particularly at the north end. The Wabasca road also limits the backshore, and the beginning of extensive muskeg and

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[2]According to the Canadian Land Capability Classification for Outdoor Recreation, symbols may point out a resource characteristic as an attraction. For example a (B) for bathing beach on a Class 2 is definitely an attraction. In contrast, a feature symbol used descriptively indicates only the presence of a certain recreational resource, which is not sufficiently noteworthy to be termed an attraction, for example, the (E) for vegetation cover on a Class 6 shows that trees are present, though not noteworthy.

marshland to the east of the road (Plate 7) decisively hampers landward development.

Sand Dune Beach as it has been named for this study, is the next shoreland unit in the inventory. This Class 1 SBYN beach is one of Alberta's finest, as reference to Plates 3 and 4 substantiates. The beach stretches 2.1 miles from north to south, and generally measures 80 to 100 feet in width. Offshore gradient is a very gentle five feet in 200 feet horizontal distance although periodic low bars provide variations in the wet beach[3] level. The 1 SBYN rating indicates that the bathing beach (B) is the prime attraction, with family boating (Y) and shoreland suited for family cottaging (N) being of lesser importance. Indeed, the gentle offshore gradient and the dunal backshore are less than perfect for cottaging and boating.

The dry beach rises immediately before the dune. As Plate 4 makes clear, good cover of scrub bushes and full grown poplar and spruce trees covers the slopes. Plate 3 gives some idea of the forty to seventy-five feet of relief between the water level and the top of this longitudinal dune. Unfortunately, the present Wabasca road meanders along the dune crest making any backshore development almost impossible. Occasional blow-outs exist along the dune, (Plate 7) and they too limit the usable backshore. Only four cottages have been built along Sand Dune Beach, all of them at places where the dune is less than its normal height. The depth of these cottage lots is reduced by the road, so that extra frontage is required to make up their land area. The two most northerly

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[3]See Appendix A.

cottages are only fifty feet from the busy, dusty road, while the other two have approximately one hundred feet clearance. The three most northerly lots have a precipitous location above the beach sands, while the southernmost cabin lies only one hundred feet back from the water, on a dry beach site. This latter cottage is actually within the next shoreland unit as its site has willows and rushes at water's edge, and a thick willow growth covers the sandy beach (Plate 5).

Part of Sand Dune Beach falls within two triangular outliers of the Lesser Slave Lake Provincial Park (Figure 5). These two detached property units are separated by the mid-beach cottages, on privately owned land, while the two southern cabin areas prevent southward park extension. It is hoped that in the near future the Sand Dune Beach area will become a complete park unit linked to the larger part of the Provincial Park. Furthermore, Provincial Government officials are proposing the relocation of the Wabasca road to the lowland area east of Sand Dune Beach. If this is accomplished, more backshore land on the beach will be freed for recreational uses.

The Class 4 SYAN unit at the southern end of Sand Dune Beach forms another transition zone. It has willows along the water line and a sandy backshore which is low and periodically inundated. The mosquito problem is especially bad in this wet area, although spraying, willow clearing and some drainage could bring a great increase in recreational capability. Boating is the best use of this shore area as the (Y) symbol suggests, although angling and some wetland wildlife viewing and hunting are also possible.

At the entrance to the Lesser Slave River there is a very marshy,

Plate 5. Willows and marsh at the southern end of Sand Dune Beach.

Plate 6. North Shore campsite on a Class 3 SABN shore unit.

6 SW area, which is often flooded by fluctuating water levels. Generally, this area is choked by a profusion of rushes and willows in the shallow waters and along the low shoreland. Boating is hazardous from the Wabasca road bridge over the Lesser Slave River to the open lake. Nevertheless, the narrow navigable channel is busy with fishing and pleasure craft that are launched and docked at the bridge. Neither the Sand Dune Beach nor the shoreline immediately west of the Slave Lake townsite offer direct access to the water for boat trailers, so that the Lesser Slave River crossing has become the only boat launch. Boats can be launched directly from the road edge into the river. Furthermore, this area is protected from onshore waves and winds so that small craft can find refuge from the rough, open lake. River currents and weeds are the chief disadvantages of the launch area, and these problems are easily overcome by power boats and periodic channel clearing.

As can be seen from Figure 5 and Plate 2, the Lesser Slave River meanders widely in its traverse through the low, poorly-drained marsh and muskeg land immediately east of the lake's eastern shore. The portion of the river between the Wabasca road bridge and the edge of Figure 6 is classified into two distinct units. The upstream end is Class 4 SCA while the lower portion is Class 4 UCKA. Plate 2 shows that the river (the main channel of which runs along the extreme bottom edge of the photo) is relatively calm with a wide channel particularly suited to family canoeing. Hence the (C) symbol on both units. Pleasure boating is hampered approximately two miles down stream from the lake outlet. According to the A.R.D.A. Recreation Classification Guidelines,[4] water bodies must be

[4] Canada Land Inventory, A.R.D.A., _op. cit._, pp. 10-11.

capable of supporting family boating in order to be designated as "shoreland" and not "upland". The lower part of the river must therefore be rated as 4 UCKA instead of 4 SCKA, even though canoeing is extremely good in both units. Due to the marshy, poorly drained nature of the river banks in the upper recreation unit, camping (K) must be omitted from its rating. Angling (A) is good on the Lesser Slave River, and particularly so in the upstream reaches. In Plate 2, several anglers' cars are parked near the river crossing.

Another element of this eastern end of Lesser Slave Lake is an attractive island known as Dog Island, some two miles west of Sand Dune Beach. It is timely to include the study of Dog Island's recreational capability here. This is the only island in Lesser Slave Lake and, as can be seen from Figure 6, it has a good to mediocre capability for recreation. Dog Island is part of the newly-formed Lesser Slave Lake Provincial Park and will therefore remain under public ownership and development. The two Class 3 SBYA units on the eastern and western sides of the island are low areas with relatively narrow beaches of intermittent sand, pebbles and three to four inch gravel. On the western beach, willows grow along the water's edge while the eastern beach is clear but narrow. Immediately behind the ten to twenty feet of dry beach on the eastern shore, there is a dense cover of willows and periodic poplar and scrub birch. The mid-island area between the two Class 3 beaches is poorly drained, and for that reason the cottaging symbol (N) is not used. Bathing is the major attraction of both beaches, even though the western unit needs clearing. Offshore gradients are approximately four feet vertical drop in a distance of 50 feet on both wet beaches. Thus swimming

is good, particularly from anchored boats, while boating (Y) and angling (A) too have a high capability.

Between these two shorelands there is a Class 4 SYBA unit that faces southward onto a pleasantly sheltered cove. The beach is composed of two to three inch pebbles and gravel, with occasional sandy patches. Materials on the long, southward extending spit, range from gravel on the island end to large twelve to twenty-four inch boulders at the southern tip. Boating along this spit is risky, since water depths vary drastically and large rocks protrude nearly to the water surface. The dry beach, like that on the eastern shore is only ten to twenty feet wide. It is interesting that the offshore gradient is quite sharp, with a four feet depth of water at thirty feet from shore. Beyond that, however, the gradient is gentle. The relatively narrow beach is backed by a dense growth of willows, balsam poplar and intermittent spruce. The immediate backshore rises some five to eight feet above the water level then tapers northwestward into the low area in the centre of the island. Boating (Y) is the prime attraction of this shore unit, as the gravel beach, poor backshore and moderately steep offshore gradient limit family bathing (B). Accessibility to a good angling area (A) is also available. It is unfortunate that the beach area was not longer and had a better backshore, as these are the factors which have placed it into a Class 4 rating. Furthermore, marker buoys must be placed along the spit to prevent damage to boats which come to anchor in the pleasant protected bay.

The northern shore of Dog Island is classed as 3 SBYN. The beach is similar to that shown in Plate 9 and the well covered backshore rises steeply to about 20 feet above the water. Beach materials are mainly

large twelve to twenty four inch boulders, although smaller rocks and three to six inch stones also prevail over parts of the dry area. A good gravel beach in the southwest portion of this unit is backed by a twenty to thirty feet cliff. Bathing (B) is not as pleasant as on the island's southern shore, as the beach rocks are large and there is a steep offshore gradient along this usually rough water area. Nevertheless, the length of the beach and the well drained rise of the backshore give the unit sufficient capabilities to be rated as Class 3. The backshore rise is much easier at the northeast end of the island. Cottage, picnic ground and campsite (N) development would all be feasible here, and the area should be the centre of recreational facilities and shore-based activities on Dog Island.

The final unit on Dog Island is a very small 4 SYA area on the northeastern shore. No real dry beach exists there, as willows and the backshore cover extend right to the water's edge. The offshore gradient is similar to the 3 SBYA unit immediately south, so that boating (Y) is possible close in to the shore, and accessibility to a good angling area (A) is assured. Beach materials vary from stones and gravel on the north to sand and gravel toward the south, but the beach cannot be developed to recreational use until clearing is undertaken.

In summary, then, it can be concluded that the shoreline of Dog Island is not particularly good for recreation. Its big advantage is that it is crown-owned property in a completely virgin state. When Provincial Park development commences on the island, several of the Class 3 beaches can be improved for bathing while the sheltered cove at the southwestern corner could be set aside as a boat docking area. Dog Island

offers a good potential for the construction of a water-oriented camping and picnic area similar to British Columbia's Marine Parks.[5] Such a campsite would be a unique attraction to the boating public and, as Dog Island is only 1.75 miles from the Lesser Slave River boat launch, even small craft could make the crossing. Some clearing and mid-island drainage and filling would be required, but the results would be most rewarding. South of the Lesser Slave River a Class 4 SAYN unit extends westward along the southeastern shore of the lake. It is a relatively poor recreation area as it is low along the water's edge with a slight rise back from the shore. Hay meadows characterize the backshore while the shoreline is mainly till with rushes and some willows in the more poorly drained localities. The occasional patches of beach are very narrow with a clay and rock covering. Grasses grow to the water line too, so that swimming or beach activities are out of the question. Fishing (A) from boats is the main attraction, as pike and pickerel abound in the shallow, weed-infested waters. Boating (Y) and cottaging (N) are recorded in the classification as descriptive symbols rather than as attractions. The backshore could support cottages, but its capability is lower than that of areas further north on this eastern shore. Indeed, this 4 SAYN unit will be developed only when most of the better areas are filled. On the evidence of the demand studies to be presented later, this probably will not occurr for many years.

The delta area of Mooney Creek[6] forms the next unit in the

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[5]British Columbia has recently built several Marine Parks at Bowen Island, in the Gulf Islands and a new one is proposed for the Sechelt Coast.

[6]Figure 6 shows but does not name this creek.

inventory. It is a shoreland with a very low 6 SW rating, as befits its origin. Drainage is poor and the low character of the land subjects it to periodic inundation. Weeds and bushes grow out into the water so that no beach is even visible. The offshore waters are very shallow and thus abound with weeds. Certainly, boating or any other water activities are ruled out. Only wetland wildlife viewing and hunting may attract the recreationist, although both land and water accessibility to the unit are difficult. This is a very poor capability area.

The final unit in the sample study is classified as 4 SAY. This unit, like many along the southeastern littoral, is rather poorly drained with bushes and willows along the shore and a very dense cover of offshore weeds. No true beach exists, as the till is exposed at water's edge. Angling (A) is generally good in the shallow weed-infested water and boating (Y) is possible but difficult. Once again these two symbols (A) and (Y) are more descriptive than attractions since this Class 4 unit has a mediocre to poor capability.

In summary, then, a number of general conclusions can be reached about the recreational capability of the southeastern shoreline of Lesser Slave Lake. The Sand Dune Beach stands out as the best beach on the whole lake, although the narrow backshore creates a development problem. The three units north of Sand Dune Beach have a high capability both on the beach and backshore. Conversely, the southeastern corner of the lake has poor recreational capability because of its generally weedy shoreline and poorly drained backshores. Dog Island is between these extremes in capability, and its insular nature gives it a certain virgin or adventurous appeal to the boating, camping and picknicking public.

In contrast to the shoreland, the recreational capability of the upland is generally very low. In the southwestern corner of Figure 6 the edge of the Swan Hills plateau can be noted. The 5 UEO classification indicates the beginning of relief combined with a pleasing cover of dense forest (E). Figure 5 demonstrates the change in terrain even more clearly as the symbol (Q) points to "patterns of topography and land form exhibiting interesting diversity of landscape."[7] Both these units on the flank of the Swan Hills, as well as the units on Marten Mountain, have the feature (O) for wildlife viewing and hunting. As mentioned in Chapter 2, hunting is generally good over these hill lands.

The island unit to the west of Slave Lake townsite has the (P) symbol for an interesting cultural landscape pattern,[8] since some of the natural meadows have been converted to agricultural use. The use of (E) and (P) together within one classification formula is indicative of a transitional zone between a relatively treeless or usually a farm region, and a densely forested belt. The (E) symbol precedes the (P) if the unit is more than fifty percent tree or bush covered.

A narrow 6 UWP zone along the north bank of the Lesser Slave River is another area of hay meadows, although the (W) for wetland wildlife viewing and hunting is the greater recreational attraction. Trees and bushes are still present in this very flat, poorly drained area, but open land predominates. The marsh and muskeg area east of Sand Dune beach has a very low 7 UE rating as the low tree and bush cover (E) is

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[7]C. S. Brown, Canada Land Inventory, A.R.D.A., Outline of the Canadian Land Capability Classification for Outdoor Recreation, March 1966, p. 10.

[8]Ibid., C. S. Brown.

the only feature. Even in this poorly drained zone wetland wildlife is concentrated around the water bodies, such as Muskeg Lake on the extreme eastern edge of Figure 6 and the smaller unnamed lakes of the inter-dunal zones. 7 UW distinguishes these from the depressional marsh lands while the longitudinal dune area is rated as 5 UL. The dunes have no major attraction, other than the fact that they are unusual landform (L) features. This is sufficient to raise them to a higher class in the A.R.D.A. Recreation Capability Inventory.[9]

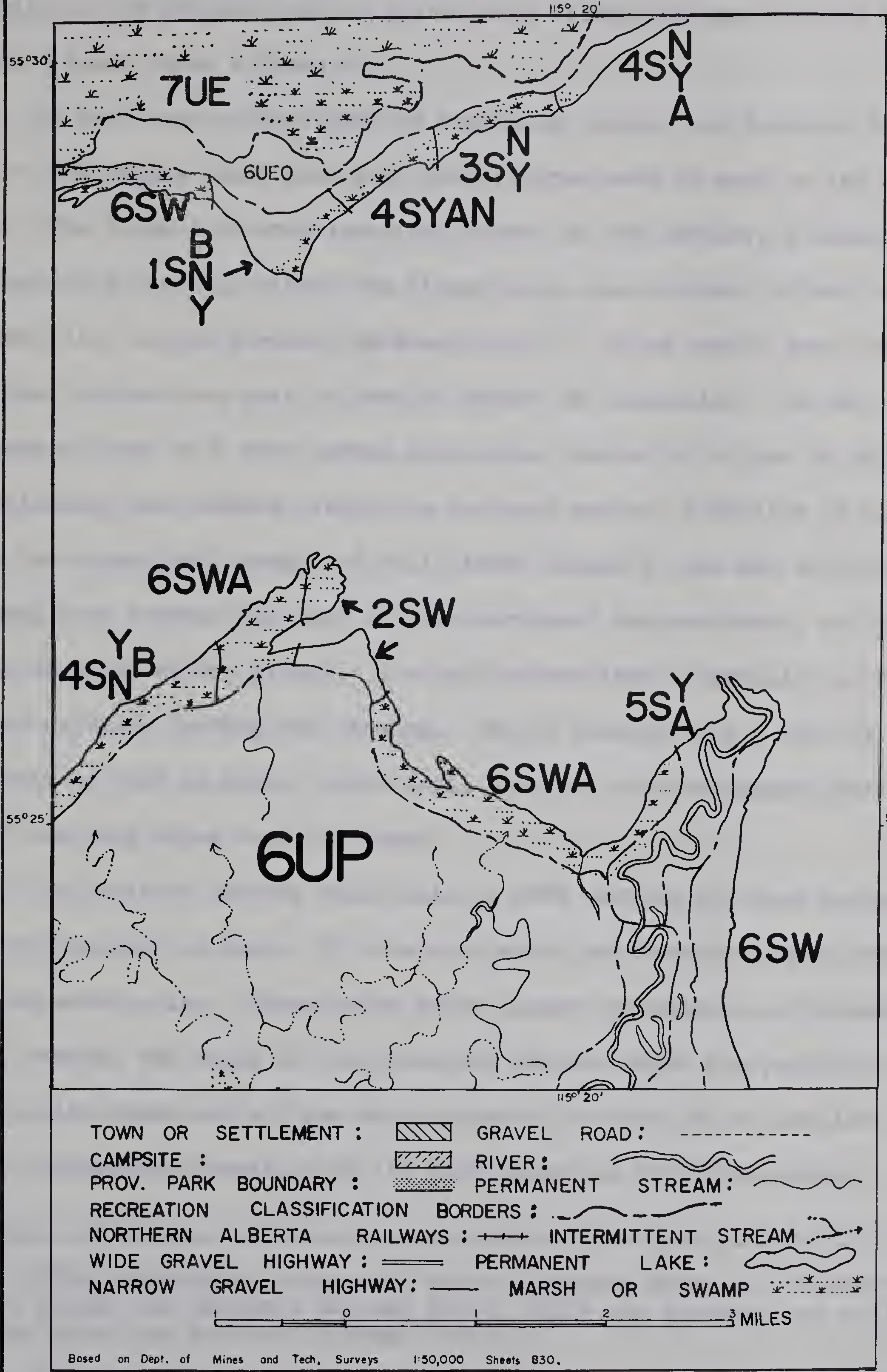
C. The Narrows of Lesser Slave Lake (Figure 7).

The Narrows area covered by Figure 7 is in striking contrast to the extreme southeastern corner of Lesser Slave Lake. This central zone is very low and often inundated on either side of the Narrows, so that its beach units are generally poor in recreational capability. As has already been seen in Chapter 2, the south side of the Narrows is part of the Swan River delta. The northern shore is also of deltaic origin, although Narrows Creek (Figure 2) enters the lake considerably west of the Narrows. It is only a minor creek, draining the low-lying drift area north of the lake whereas the Swan River drains much of the western part of the Swan Hills plateau.

In further contrast, with the southeastern area, neither shore of the Narrows is backed by a bedrock exposure, although a very low ridge runs in an east-northeast direction from a point roughly ten miles east of the Narrows. This zone of relief can be seen in the 6 UQEO upland unit. Other than this minor hilly zone, there is no local relief in the

[9] See Appendix A.

Figure 7 RECREATIONAL CAPABILITY at The Narrows of Lesser Slave Lake.



vicinity of the Narrows, and no upland unit within the area covered by Figure 7 rises above a Class 6.

To turn now to the shoreland capability units, the detailed inventory of the sample study area will proceed from west to east on the north shore. The class 6 SW area immediately west of the Narrows, although it does not fall strictly within the thesis area, has a direct effect on the accessibility to the Northern Narrows Point.[10] It is really just a marshland that varies from year to year in extent of inundation. It has rushes and some willows in a very narrow shore zone, backed by a line of willows approximately one hundred yards from the open water. This line of willows marks the approximate margin of solid land, though it too can be flooded. A muskeg area borders the unit on both northeast and northwest, so that it has no elevated dry ground. Its only recreational capability is for wetland wildlife hunting and viewing. Travel through such a unit is difficult on land or water, and a trail shown on the topographic base maps[11] has long since been abandoned.

The Northern Narrows Point rates 1 SBNY despite its poor accessibility from east or west. It is a spit which has been developed through wind and wave action. Clean white sands, grace its western or windward shore, whereas the sands of the protected eastern shore are partially covered with reeds and willows which grow to the edge of the shallow water. The western beach, with its fine sands and favourable slope,

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[10]For convenience, the point on the northern shore of the Narrows will be called the Northern Narrows Point, while the southern one will be referred to as the Southern Narrows Point.

[11]Department of Mines and Technical Surveys, 1:50,000 Map Sheet 83O/6 West. Ottawa, 1961.

rates highly for bathing (B). The flat backshore is only ten to fifteen feet above the water level and some trees and bushes provide cover. It is therefore a very desirable site for cottaging and other backshore development. Boating is attracted to the point area, particularly to the leeward shore where the sheltered water is suitable for launching facilities. Offshore waters through the Narrows are extremely treacherous, and a ten foot swell is more the norm than the exception. Such conditions obviously discourage pleasure boating and angling, except immediately onshore or in the calmer, more protected waters in the lee of the point.

The weeds and rushes might discourage bathing on the lee shore, but it is definitely more attractive to both boating and angling recreationists. At times, the breakers hitting the windward sand beach are also a deterrent to swimming and bathing; but it is doubtful that conditions are any worse there than at Sand Dune Beach on windy, rough days.

Immediately east of the Northern Narrows Point, drainage deteriorates and the shore units gain only a 4 SYAN rating. Boating and angling activities are the best use of this shore area as the beach is lined with weeds and rushes even into the water, and grasses and wetland vegetation prevail on the poorly drained backland. Shore materials vary from sand in the west to mainly gravel and rocks in the northeast. Bathing and other such beach uses are discouraged by the vegetation and shore materials. Cottaging has some potential on the narrow relatively low, sparsely vegetated backshore, although it is not likely that development would come until after the Narrows Point was completely in use.

A Class 3 SNY unit follows next. Shoreline weeds and rushes hamper swimming and bathing along this till teach, but weed clearing at the south-

western end of the unit would reveal a good quality sand beach. This sand characterizes a small spit which has formed at the boundary of the Class 3 Class 4 shore units. Backshore conditions are generally poor here, except for a very small area of better drainage directly behind the spit. The (N) in both classifications refers to this area's cottage potential while the (Y) indicates the slightly protected offshore zone of easy boating. Weeds in the immediate shore area are a problem for power boats, but these can easily be cleared if cottage development begins.

The last northern unit shown in Figure 7 is a mediocre to poor Class 4 SNYA area. Large six to twelve inch boulders cover the dry beach area, and almost completely prevent swimming or bathing. Boating (Y) and angling (A) are favourable from the moedrately dipping wet beach. Some protection for boating is provided by a small headland which marks the boundary with the 3 SNY unit. The greatest potential, though, is for cottage use (N) since the backshore is well drained and somewhat higher than those found further west. The backshore rises abruptly some ten to twenty feet from the twenty feet wide rocky dry beach and then aspen poplar and various bushes cover the backshore so that generally it has good capability for the construction of recreational facilities. Plate 9 shows the poor beach area of this unit, and it can easily be seen that the backshore is the unit's greatest asset.

In summary then, it can be said that the northeastern shore area covered by Figure 7 has a recreational capability similar to the southwestern shore of Figure 6. Both areas have poorly drained backshores, while weeds, willows and rough, rocky beaches detract from the immediate shoreline. Both areas have very limited recreational capability, and this

generalization holds true for most of the northern shore of the eastern half of Lesser Slave Lake.

The few units which have been discussed in this sample study are representative of a much larger area. Class 4 and Class 3 beach units are the norm as far east as Marten River. Beaches are usually rock or boulder covered, with some patches of sand in some of the Class 3 units. A very dense cover of poplars, birches and low bushes typifies the elevated backshore and land access is restricted to a rough cut-line trail which lies some one hundred to one hundred and twenty-five feet back from the beach.

Attention must now be turned to the southern shore of the Narrows, beginning with the 6 SW unit in the southeast corner of Figure 7. This unit has a very limited recreational capability as the shoreline is indefinite and backshore is a low, poorly drained marshland. A heavy growth of willows line the water's edge and, in many places, this cover stretches ten to fifteen feet out into the shallow waters of Auger Bay (Figure 2). The lake bottom and shoreline are muddy from the deltaic materials, though nine to eighteen inch boulders and rocks cover many underwater areas. Offshore gradients are a relatively steep ten to fifteen feet vertical in one hundred feet horizontal distance. The prolific weed growth, shallow water and rocky bottom make boating undesirable and fishing impractical. Angling in turbid waters laden with algae-bloom is difficult enough without the additional hazards of heavy weeds and large rocks. Wetland wildlife viewing and hunting are the only possible recreational features of the western shore of Auger Bay. Even these activities are difficult in a marsh zone which is almost inaccessible by land or water.

Swan Point as the Swan River delta extension is called, forms the

next unit. It rates only a 5 SYA classification because the marshiness of the river edges and the weedy-infested water limit both boating and angling, the only two activities which are possible. The Class 5 rating is normal for most rivers, so that proximity to Lesser Slave Lake is not sufficient of an advantage to raise the rating of this unit. On the contrary, the slow, meandering, weedy nature of the river at its outlet is a definite limitation to recreational capability. Canoeing is an attraction of the Swan River, but boating can be managed only in the lower reaches, and even then with difficulty.

A large zone of Class 6 SWA shoreland lines most of Gimlet Bay, and continues to the western side of the Southern Narrows Point.

A good part of this bay was cropped for hay until twenty-five years ago, when lake levels were lowered during a long dry period.[11] In the summer of 1966 Gimlet Bay, the inlet between Swan Point and the Narrows Point, was totally inundated to a depth of three to five feet. A till bottom fosters a profuse growth of grass and weed, while willows choke the indefinite shore and poorly drained backshore. Wetland wildlife are the greatest users of this shore unit, although a good perch, pike and pickerel population inhabit the shallow bay. Angling is better in Gimlet Bay than on the western side of Auger Bay simply because boat accessibility is better. The fish are probably equal in numbers in both bays, but the grassy till bottom of Gimlet Bay is less dangerous for power boats.

The tip of Southern Narrows Point, between the two marshy shores,

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[11] Per. comm., Dennis Forsythe, Slave Lake Fish and Wildlife Officer.

has been accorded a special 2 SW classification, even though its physical capability for active recreation does not differ from the adjoining units. Its sole distinction is the presence of the only pelican colony on Lesser Slave Lake. Indeed, the pelican is so scarce that any colony becomes noteworthy. Fish and Wildlife officials caution against publicizing these colonies, however, since they wish the nesting birds to be undisturbed on their small, reed-encircled rock islands. Utikuma Lake, about twenty miles north of the Narrows, has almost lost its pelican population to illegal hunters and oil workers. Therefore, Fish and Wildlife officers are now protecting the pelican colonies on both lakes, though they must rely upon public cooperation for their success.[12]

The final shore unit covered by Figure 7 is a Class 4 SYBN. The backshore of this clay-sand beach is low-lying and poorly drained, with willows in the wet areas and some birch and cottonwood trees covering the drier zones. Willows are found at the water's edge too, but some clearing would expose good sand patches. The offshore gradient is fairly gentle so that bathing and swimming would be possible, although not specially attractive. Boating (Y) is probably the best use of this shore unit with bathing (B) and cottaging (N) providing alternate capabilities. The narrow, slightly raised backshore bar holds some potential for cottage development if the insect nuisance can be overcome in this area of marsh and poorly drained land. Mosquitoes are the major pest and much spraying and draining is needed throughout the Narrows zone before more land can be opened to recreational use.

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[12] Loc. cit.

The upland unit south of the Narrows falls into the 6 UP category. It is a flat delta area with rich soils which have attracted agricultural development. Small groves of trees dotted across the cropped area, give it the appearance of a parkland landscape. The upland north of the Narrows is generally a poorly drained unit. The predominant landscape consists of muskeg with its characteristic growth of black spruce and Labrador tea. It is classified as 7 UE, the lowest of all ratings. A slightly higher capability is provided by occasional slightly elevated and better drained areas which continue the dense forest cover (E) of the lake's northeastern shore. Upland game is more likely to be found in these better drained areas, so justifying the addition of an (O) symbol to the 6 UEO classification.

D. Other Notable Lakeshore Units

This study would not be complete without reference to a Class 2 beach unit. A Class 2 SW marshy shore unit was discussed in the inventory of the Narrows area, but no Class 2 beach unit was included in either sample study. Such a unit is found at Canyon Creek (Figure 5) (Plate 11). Here a beach more than 350 feet long stretches west from the small Canyon Creek delta. It is formed primarily of clean white sand although the western end is overlain with a layer of one to three inch stones. In places throughout the stony zone, sand is exposed, especially on the gently sloping wet beach. At one hundred feet from shore, the water is only five feet deep so the gradient is particularly favourable for bathing and swimming. A road runs parallel to the beach immediately behind the trees on the right of Plate 11, which means backshore cottage or picnicking-camping development are not possible. The Northern Alberta Railways main-

line worsens the backshore problem by paralleling the road on the south. Indeed, the backshore here is non-existent and the Canyon Creek Hotel in Plate 11 had to be built on the delta area, north of the road and tracks.

This characteristic of a minimal backshore is typical of much of the lakeshore east of Canyon Creek. Plate 8, for example, shows a unit near Widewater which is a striking example of the railway's detrimental effects on shore units. Small shore areas are cut off from their uplands, to limit any possible backshore development. The waterline route is the easiest and most level for the railway, and recreational potential was not even considered in 1917 when the Northern Alberta Railway line was built along the southern shore of Lesser Slave Lake. Good quality beaches were covered with ballast and the sinuous lakeshore had a relatively straight rail line superimposed on it. Many mink ranchers between Wagner and Widewater condemn the railway because it blocks their direct access to boat docks and beaches. The ballast also has a tendency to slump into the water, so that even the sand on the wet beaches is mixed with gravel. From a recreational point of view, it is unfortunate that the railway takes this water-line route, but the proximity of the edge of the Swan Hills plateau in the Canyon Creek - Wagner zone left little alternative.

Plate 7. A blow-out area on the backshore of Sand Dune Beach.

Plate 8. The Northern Alberta Railways mainline along the south shore near Wagner.

CHAPTER IV

THE PHYSICAL QUALITIES OF WABAMUN LAKE

In Chapter II it was noted that an appreciation of the recreational potential of any area presupposes some understanding of its natural qualities. As in that chapter on the eastern half of Lesser Slave Lake, the surface configuration, climate, flora, soils and fauna of Wabamun Lake will be described here.

A. Surface Configuration

Wabamun Lake has a very pleasant situation between a height of land to the north and northwest and a hilly region to the southwest. Most of the extreme southeastern corner of the lake has a low marshy hinterland while the east is undulating to rolling land with marsh and muskeg in the depressions. The landscape of the southwestern corner is typified by cropland interspersed with groves of aspen poplar. A similar agricultural area is found along Highway 16 where long, gently rolling, wooded hills north of Wabamun townsite give way to a flatter upland west of the Fallis corner. This upland area has a scattering of farmsteads along the highway, so that the mixed forest is broken frequently by open fields. Several impressive views can be enjoyed from this elevated plain, particularly east of Fallis. From here, highway travellers can see most of Wabamun Lake's twelve mile length, and the hills to the southwest provide a pleasant backdrop for the lake's attractive setting.

Drainage is to the east by way of a short drainage channel known as Wabamun Creek which turns south at the Duffield moraine before

Plate 9. Rocky Class 4 SNYA shore unit on north shore of the eastern half of Lesser Slave Lake.

Plate 10. Marten River campsite beach area Class 1 SBNY.

emptying into the North Saskatchewan River. It has been suggested that Wabamun Lake "possibly extended much farther east at one time and covered the general area east and beyond Duffield. The numerous small lakes south of Duffield are possibly remnants of a greater Wabamun Lake."[1] Further evidence is provided by the wide occurrence of low deposits of sand and silt south of Wabamun Lake, and by deposits of lacustrine sands and gravels to the east. The pre-glacial Pembina River must have flowed through the low divide west of Seba Beach, then along the line of the Wabamun Lake basin before flowing northeastward. A similar flow existed in the Isle Lake - Sturgeon River valley system. "This hypothesis is supported by the fact that the north shores of both Isle and Wabamun Lakes have cliffs which suggest a pattern of fluvial dissection by . . . a river system much larger than the present drainage system."[2] This system probably developed during and continued after the period of glacial recession. Thus, the height of land north and east of Fallis as well as the relief on Coal Point owes its existence to erosion during glacial and post-glacial times. Certainly the periodic cliff-like exposures of sandstone add interest and ruggedness to the otherwise gentle slopes of the lake's littoral. On Coal Point, several poor-quality, lignite exposures can be found. Small pieces of coal are washed into the lake leaving a black oily scum on the water. Small fragments of coal are also mixed into the sands of the beaches. The strip-mining coal region immediately

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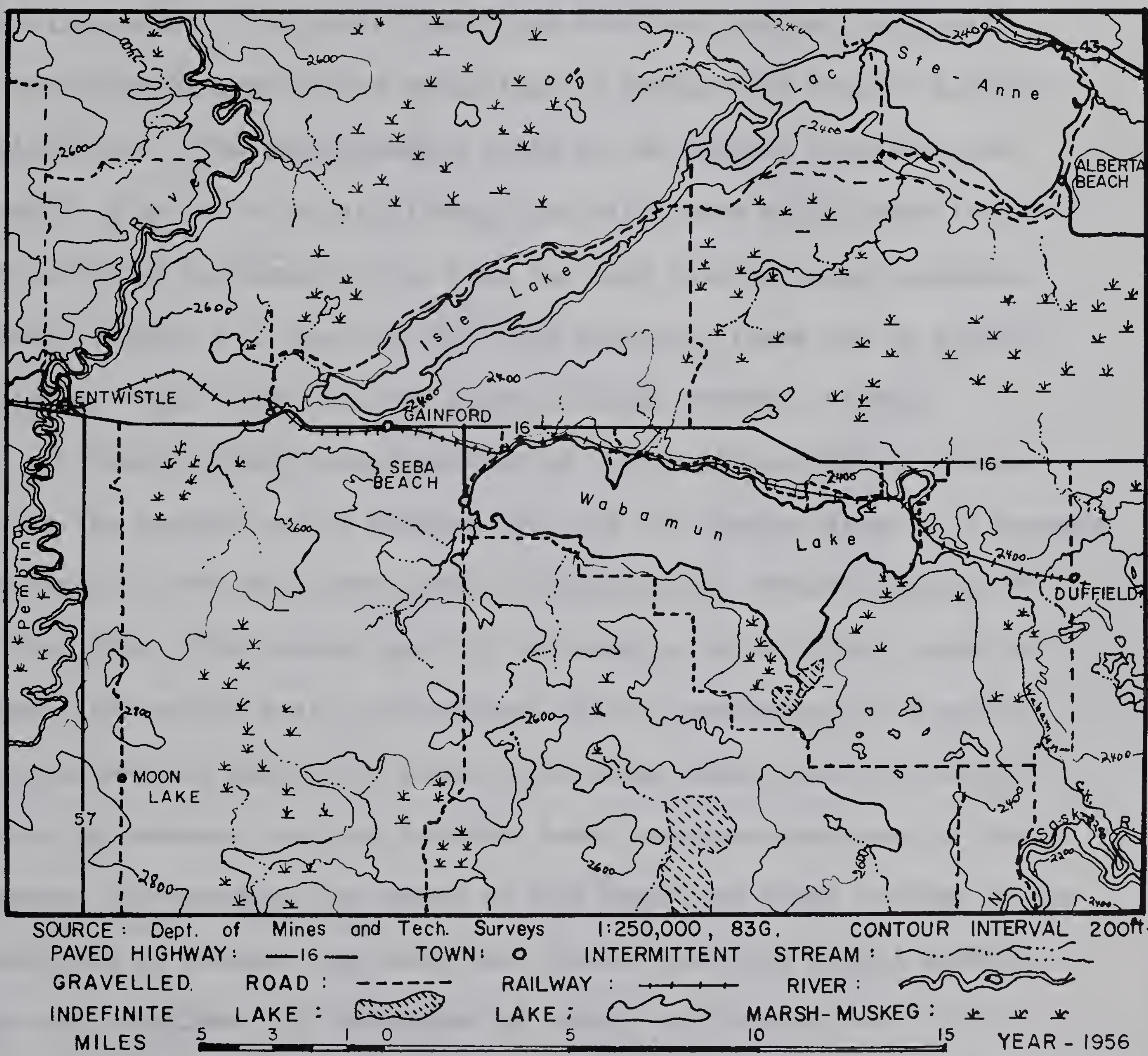
[1] R. L. Rutherford in J. A. Allan, Soil Survey of St. Ann Sheet, Bulletin #2, Edmonton, 1930, p. 56.

[2] G. A. Collins and A. G. Swan, Glacial Geology St. Ann Area, Research Council of Alberta, Report No. 67, Edmonton, 1955, p. 14.

Figure 8 THE WABAMUN LAKE REGION



northwest of the Wabamun power plant adds a different kind of landscape variation. The deep strip mines and the piles of over-burden give an ugly roughness to the gently rising lake hinterland. Vegetation can do nothing to conceal these unsightly scars.

It is clear, then, that the relief of the Wabamun Lake area is generally uneven. Preglacial landforms have been subject to glacial and post-glacial erosion and deposition to produce the present surface configuration. The physiographic units of the Wabamun Lake area are primarily glacial in origin although the hilly area which rises to 2,700 feet elevation southwest of the lake has been developed upon sandstone bedrock[3] (Figure 9). Most of the other surficial forms are of glacial origin, although there are some recent fluvial deposits as well.

A broad central ground moraine of brown till occupies the area between the western end of Wabamun Lake and the Pembina River. It extends northward to cover the areas north of Wabamun Lake between Sangudo and Lac Ste. Anne. The central part of the moraine is relatively high and explains the relief west of Seba Beach. At its perimeter, wave action developed beaches during the period when large lakes, such as the fore-runners of Wabamun, Chip and Lac Ste. Anne, extended over most of the lowlands. For example, the sands of Seba Beach and other beaches at the western end of Wabamun Lake have been formed from this ground moraine, which has a maximum till thickness of nearly one hundred feet.

Approximately five to eight miles east of the present eastern lakeshore of Wabamun Lake lies the Carvel silt till moraine. This is

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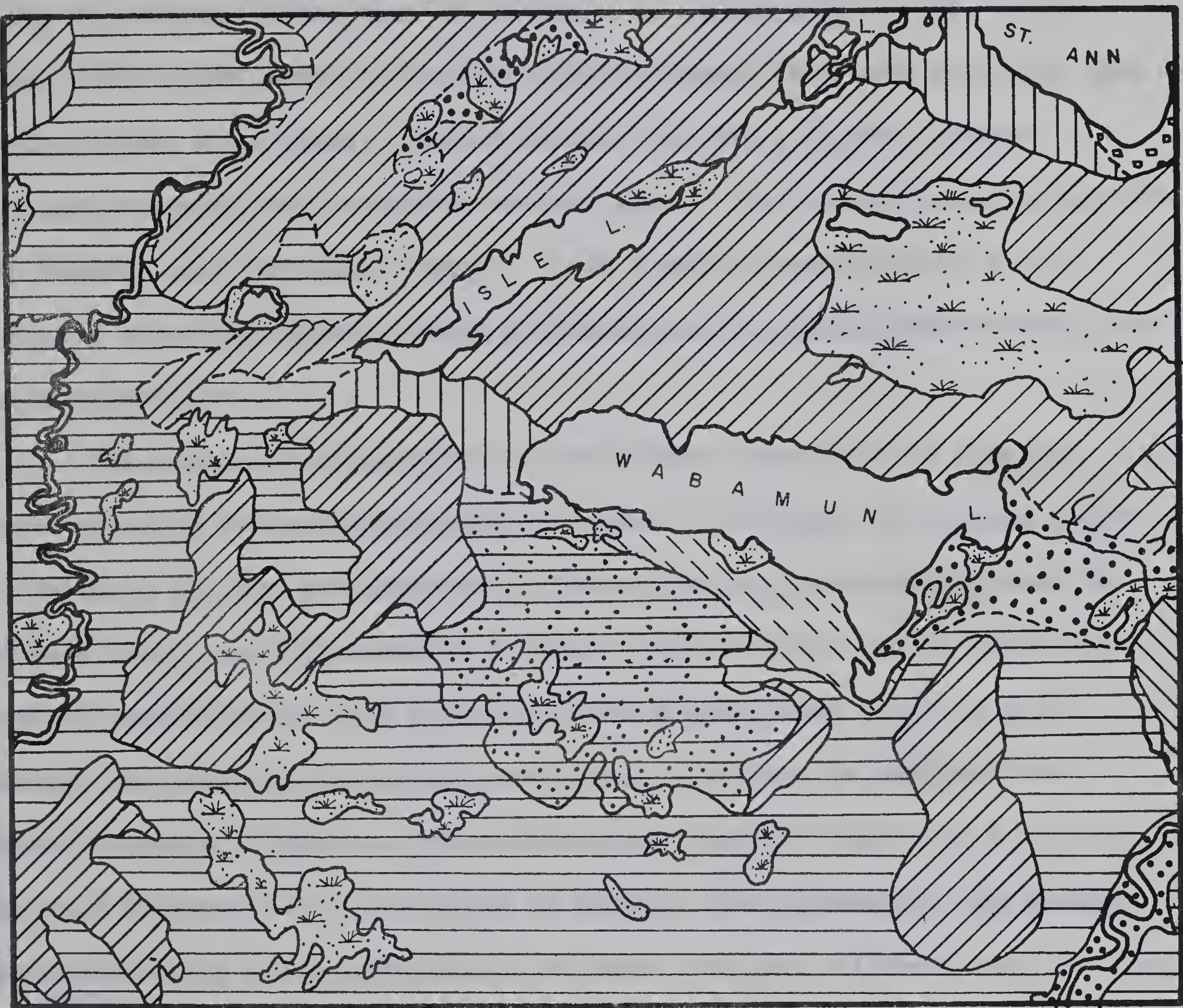
[3]These are Paskapoo sandstones of Paleocene age although recent fluvial materials overlie. See Ibid., St. Ann Preliminary Map of Glacial Geology.

Figure 9 WABAMUN LAKE REGION GLACIAL GEOLOGY.



SOURCE: Research Council of Alta., "Preliminary Map Glacial Geology St. Ann Area 1955."

RECENT

FLUVIAL MATERIAL
- MUCK AND SWAMP
- GRAVEL AND SAND

LACUSTRINE & BEACH MATERIALS
- BEACH SAND AND SILT

PLEISTOCENE

GLACIO-LACUSTRINE MATERIALS
- LAC. CLAY IN PART PRE-SILT TILL, CLAY, MODIFIED, HIGH RELIEF

- INTERGLACIAL SAND
- MODIF'D BR. TILL, GR. MORAINE, ETC.

GLACIAL MATERIAL
- GROUND MORAINE, MASSIVE BR. TILL

PALEOCENE

PASKAPOO FORMATION
- SANDSTONE

4 3 2 1 0 4 MILES

N

an area of relatively high relief consisting of knobs and kettles. The kettles are roughly circular depressions which periodically fill with water as drainage throughout the moraine is generally poor. Mink Creek which flows south to the North Saskatchewan from near Duffield, and Kilini Creek, a northeast flowing stream from Manly Corner, meander through muskeg on the moraine's western edge. This muskeg now occupies the old Wabamun Lake drainage channel. Deep glacial deposits filled the channel, diverting Wabamun Creek southward and the North Saskatchewan into an eastward flow.

The surface configuration of the Wabamun Lake area is a major attraction for recreation within the region. The hilly to rolling nature of the land and the preponderance of water bodies, particularly east of Wabamun Lake, give considerable interest and diversity to the landscape. Indeed, recreation is well suited to this transitional area[4] in which farming is poor, soil materials are coarse, drainage is difficult and relief variable. Electric power production, using strip-mined coal, is the only industry in the vicinity of Wabamun Lake except for the Wabamun plywood factory which periodically releases noxious effluent into the lake.

B. Soils

It has already been mentioned in Chapter III that soils are important to the recreational capability of an area in terms of their suitability for the development of roads, and backshore facilities and for drainage. They also provide a base for beach development and for the growth of vegetative cover. The soils around Wabamun Lake will be

[4]The Wabamun Lake area is referred to as transitional because it is on the border between the settled agricultural part of Alberta and the unsettled less attractive area for development.

reviewed with these points in mind.

> The soils, . . . (in the Wabamun region) are for the most part the result of the weathering of glacial debris deposited by the retreating ice sheet.[5]

In general three types of soils can be found within the area, depending on parent material.

There are soils associated with the morainic or till, with lacustrine deposits and with marsh. The area around Wabamun Lake falls into the wooded podsolic soil belt.[6] When plowed, these soils have a light-colored appearance. Crop returns are generally mediocre to unsatisfactory although bushes and trees grow well in uncultivated areas.

Within the wooded podsolic soil belt, there are three major soil classes: loam, silt loam and peat. Generally, the loam soils predominate on the morainic and till areas to the northwest and southwest of Wabamun Lake. Silt loam covers most of the area to the south, southeastern and east of the lake. Pockets of peat or organic soil are found in the old glacial drainage zone east of the Provincial Park at Kapasiwin, in front of the Wabamun townsite area, and in the old drainage channel west from Seba Beach to Lake Isle.

The most recent soil map of the Wabamun Lake area is based on a much more detailed survey than the 1930 edition, but the basic information is not greatly changed. The wooded podsol loams and the organic peat soils are more finely subdivided, but their distribution patterns still agree closely with the earlier map. The principal change applies

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[5] F. A. Wyatt et al, Soil Survey of St. Ann Sheet, University of Alberta, College of Agriculture, Bulletin No. 20, April, 1930, p. 23.

[6] Ibid., accompanying Soil Survey Map of Lake St. Anne District.

to the silty loams which are now generally classed as either solonetzic or regosolic rather than podsolic. Of particular interest is the regosolic type, codessa series, which occurs along most of the northern and western shores from Wabamun townsite to Seba Beach. It consists of coarse, well drained alluvium on which nature soils have not yet been able to develop. Periodically in the series there are deposits of sands, which give rise to good quality beaches of a dark grey or brown colour. These occur on Coal Point near Fallis at Seba Beach and on the YMCA point southeast of Seba Beach. Drainage at these sandy areas is good to excessive. Certainly, these alluvial deposits are the most important soil type for recreation, since the existence of good quality beaches is paramount in the capability of a lakeshore.

The large marsh and swamp zones, with their peat soils have a negative recreation capability. Such soils[7] occur widely about the bay on the lake's southeastern corner, while smaller organic soil areas are found on the lakeshore of Sundance directly across the lake from Coal Point, west of the Boy Scout Camp, and along the shore on both sides of the Wabamun townsite point. All of these smaller areas are low in relief and have poor drainage, but pressure for recreational shoreland has brought about some local drainage and development. The development of the Provincial Park at Kapasiwin through draining, sand importing and backshore clearing is a major example.

Since no new description of the St. Ann sheet soil survey has yet

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[7]According to the 1967 St. Ann soil map, these organic soils are classified mainly as Eaglesham series, although smaller pockets of Kenzie series organic soil are found inland in the depressions on the southwest, west and north sides of the lake. Both series of soils are poorly drained.

been published, the 1930 report will have to be followed.[8] Although the 1930 map is rather generalized, the report contains sufficient detail for the purpose of this thesis (Figure 10). Discussion to this point has been directed at the general distribution of region soil types around Wabamun Lake. Now, an overall review of the characteristics of the three classes of the wooded podsodic soils will be undertaken.

The loam soils which predominate over most of the north, west and southwest littoral of Wabamun Lake are based on a till parent material. They therefore, have moderate to good drainage. Also they are much stonier than the soils on the lake's southern shore. The natural vegetation on the loam soils is mainly poplar, although the forest cover ranges from scrubby to dense stands of mature trees. Numerous areas, too, have been cleared by settlement and many fires.

As the loam soils have the greatest agricultural potential within the wooded soil belt, the western portion of Wabamun Lake area has experienced the main development. Ironically, too, this western area has been burned over more than the rest of the region so natural clearing is extensive here.

Silty loam soils exist over a large area, mainly to the south and east of the lake although one arm pushes north to Highway 16 in the Provincial Park area (Figure 10). Poplar growth is very heavy over this silty loam soil, and a spruce-poplar mixture exists in some locations. Due to the need for heavy clearing on this soil class, very little agriculture exists, even the leased zone of the A_2 horizon is thinner and

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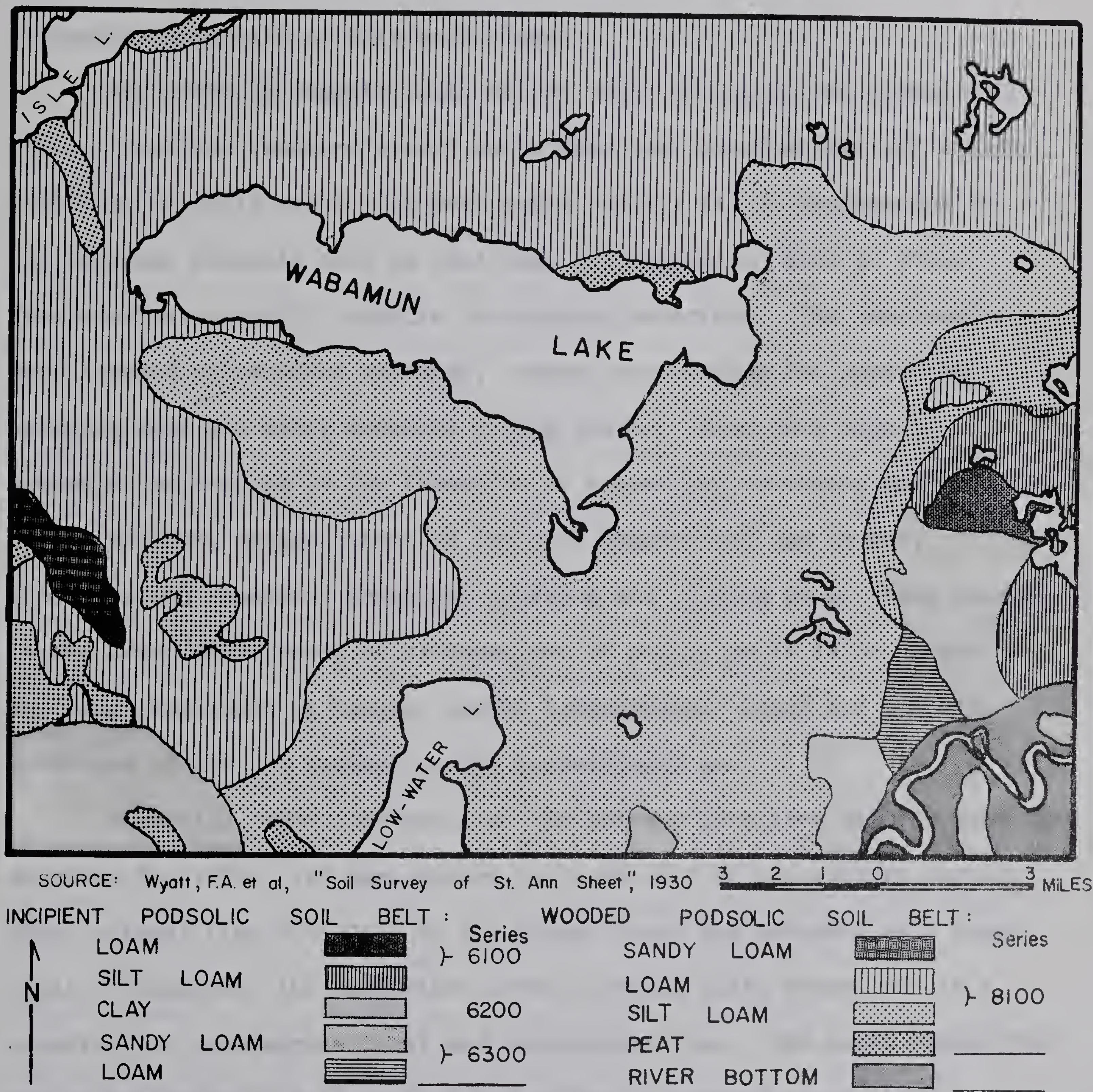
[8] F. A. Wyatt _et al_, _op. cit._

Figure 10 SOILS OF THE WABAMUN LAKE REGION



the resulting soil somewhat better than the loam class which has been widely burned over. As was mentioned earlier, much of the western area was cleared by extensive bush fires. Lacustrine deposits generally are the parent materials of this soil class.

The peats or organic soils do not truly belong to the wooded soil class. They are immature azonal soils which may occur within any mature soil zone in humid areas. The peat soils usually lie in depressions or old drainage channels such as that east of Kapasiwin. Clay or other fine materials usually underlie the organic materials. The impermeable base impedes sub-surface drainage, thereby encouraging the growth of sphagnum moss and other moisture loving plants. Soon this organic accumulation results in the formation of a peat bog or muskeg and the poorly drained, spongy nature of the area hampers all use by man. Extensive and expensive draining, clearing and filling in of these muskegs is required before roads or cottages can be built; so it is no wonder that the large marshland of Wabamun Lake's southeastern corner has not been developed either for hayland or for recreational use.

Generally, then, the soils of the Wabamun Lake area have no more than moderate fertility, and agriculture is found only in the western portion where natural fire clearance of the forest cover has occurred on a large scale. Elsewhere, the vegetative cover is still quite dense, and is a deterrent to both agricultural and recreational use. The soils themselves may be sufficiently well drained and stable to support recreational activities, but their physical potential cannot be realised as long as the dense forest cover prevails. Marsh and muskeg areas, with their organic, poorly drained, azonal soils, offer the least capability for recreation. However, as several areas west of Wabamun townsite indicate,

this soil and drainage problem can be overcome. Recreational activities are first attracted to well drained, pleasingly vegetated soil zones, but demand can lead to development on peat soils. The clearest example is at Kapasiwin where a beautiful sand beach and provincial park are developed on a badly drained, marshy shoreland.

C. Climate

The Wabamun Lake area, like the eastern half of Lesser Slave Lake, falls near the western edge of the continental cool summer climatic zone entitled Dfb in the Köppen classification.[9] The Wabamun area, though, is more typical of the Dfb climate, in which the cool summer has an average temperature of less than 71.6° F for the warmest month and at least four months about 50° F. The average temperature of the coldest month is below 26.6° F for a continental 'D' climate. As Table 5 indicates, Wabamun Lake satisfies all these criteria. The average annual precipitation at Wabamun Lake is approximately 18 inches. A pronounced summer maximum is observable, and this maximum increases to approximately 80 per cent of the yearly total if the months of April to October are referred to. Despite this maximum in the warm months, Wabamun Lake still has many long, clear, hot summer days. Late afternoon and evening squalls are typical of these hot periods when convectional uplift can build thunder heads in a cloudless sky. Nevertheless, most of the summer precipitation, like that of winter, comes from the maritime air masses which cross the mountains from the British Columbia coast.* Indeed,

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[9] W. Köppen, in R.E. James and H. V. B. Kline, A Geography of Man, Toronto, 1959, pp. 534-543.

*H. J. Critchfield, General Climatology, Englewood Cliffs, N. J., 1960, p. 223.

TABLE V

MONTHLY AND ANNUAL AVERAGES OF TEMPERATURE (^{o}F)*

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Element
Edmonton Industrial Airport					Altitude, 2185 feet					Location	53°30' N.L. 113° 45' W.L.			
7	6.6	11.2	22.1	39.5	52.1	57.8	63.1	60.0	51.5	41.2	24.5	13.3	36.9	Mean
7	15.2	20.3	31.0	50.0	63.6	68.5	74.4	71.3	62.6	51.6	52.2	21.0	46.8	Max.
7	2.0	2.0	13.2	28.9	40.5	47.0	51.7	48.6	40.4	30.7	16.8	5.5	26.9	Min.
Moon Lake					Altitude 2500 feet					Location	53° 28' N.L. 114° 59' W.L.			
7	18.3	32.2	35.6	48.2	62.7	68.1	74.0	68.7	60.3	55.3	36.2	21.1	48.4	Mean
7	11.5	3.1	4.6	26.8	37.4	43.9	46.9	44.2	38.3	23.5	15.0	-0.1	23.8	Max.
7	7.6	17.7	19.7	37.5	50.5	56.0	62.5	56.5	49.3	39.4	25.6	11.5	36.2	Min.

EXPLANATION: "Element" in Table 5 refers to mean monthly temperatures, maximum monthly temperature, monthly temperature respectively.

The "Period" code is:

7 -- At several locations the observing station was moved from the town or city to an airport during the 1930's. At many of these locations the records were kept separate, but at those locations indicated by Code 7, the airport and town data were considered homogeneous. The resulting normals are based on the full 30-year period, from 1931-1960.

*Climatology Division, Meteorological Branch, Temperature Normals of Alberta, Toronto 1964.

TABLE VI

MONTHLY AND ANNUAL PRECIPITATION IN INCHES*

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Element
Edmonton Industrial Airport														
7	.01	.01	.05	.50	1.71	3.15	3.34	2.55	1.26	.49	.14	.05	13.26	Rain
7	9.4	7.6	7.8	6.0	1.2	0.0	0.0	0.0	0.9	4.1	7.4	9.4	53.8	Snow
7	.95	.77	.83	1.10	1.83	3.15	3.34	2.55	1.35	.90	.88	.99	18.64	Ppt.
Moon Lake														
7	1.58	1.45	1.05	1.89	2.84	3.92	3.23	2.66	1.96	1.30	0.30	.69	1.91	Rain
7	15.8	14.5	1.05	11.23	1.63	0.0	0.0	0.0	6.5	.02	3.0	.69	4.54	Snow
7	0.0	0.0	0.0	7.7	1.21	3.92	3.23	2.66	1.31	1.10	0.0	0.0	1.76	Ppt.

EXPLANATION: "Element" in Table 6, gives the precipitation form, that is, rain, snow or total precipitation respectively.
The "Period" code is:
7 -- At several locations the observing station was moved from the town or city to an airport during the 1930's. At many of these locations the records were kept separate, but at those locations indicated by Code 7, the airport and town data were considered homogeneous. The resulting normals are based on the full 30-year period, from 1931-1960.

*Climatology Division, Meteorological Branch, Precipitation Normals for Alberta, Toronto 1965.

the climate of the Lake Wabamun and Lesser Slave Lake regions is mainly a product of the interaction of this Polar Maritime air and Polar Continental air from the northern interior of the country.

At no point within the Wabamun Lake area have meteorological records been kept. There are short term precipitation and temperature records gathered from the Evansburg Experimental Station. Nevertheless, they do not cover very long periods, and they are very limited in the range of data which has been recorded. Hours of bright sunshine, for example are not collected for these stations. It has therefore been decided to use only the data from the Edmonton Industrial Airport and Moon Lake. Edmonton is somewhat farther from the Wabamun region than Moon Lake. Edmonton Industrial Airport is approximately 47 miles from the eastern end of Wabamun Lake, while Moon Lake is only some 18 miles south southwest of Seba Beach. As Moon Lake is somewhat west of the Wabamun Lake region, it is in the transition zone between the continental and alpine climates. Mean average temperatures are generally lower as one moves west from Edmonton. The Edmonton mean annual daily temperature is 36.9° F, Moon Lake's is 36.15° F and that of Edson 35.3° F. Thus, it can be assumed that Wabamun Lake's mean annual daily temperature lies somewhere between that of Edmonton and Moon Lake. Therefore, the Wabamun Lake region is just in the transition area between the Dfb cool summer continental and the Dfc continental cool short summer zone according to Köppen.[10]

Table VII presents the Normal Cloud Statistics for the Edmonton

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[10] Köppen, op. cit., pp. 534-543.

TABLE VII

NORMAL CLOUD STATISTICS *

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
EDMONTON	6.5	6.4	6.4	6.4	6.4	6.7	5.8	5.7	5.7	5.9	6.3	6.4	6.2	MC
INDUSTRIAL	28	27	28	23	23	19	28	30	31	32	29	28	27	FC
AIRPORT	13	13	16	23	24	27	28	25	21	18	16	14	20	FM
17 - 20 years (period 1941-1960)	59	60	56	54	53	54	44	45	48	50	55	58	53	FO

EXPLANATION: Monthly and annual mean cloud amounts and the percentage frequency of cloudiness in the ranges of 0 to 2 tenths, 3 to 7 tenths and 8 to 10 tenths for period 1941-1960. The values listed are generally based on at least ten years of observed data. The mean cloud amounts are expressed as tenths of the total sky covered, and indicated by the letters MC in the column farthest to the right.

FC = percentage frequency of 0-2 tenths.

FM = 3 - 7 tenths.

FO = 8 - 10 tenths.

*Climatology Division, Meteorology Branch, Dept. of Transport, Normal Cloud Statistics, 1965.

Industrial Airport. No such normals exist for Moon Lake, so one must be content with those from Edmonton. Very little variation should exist between Wabamun Lake and the city, 44 miles east. Still the large expanse of open water generates clouds especially on hot summer days, so that cloud cover is probably greater about the lake than out on the flat Edmonton plain.

The large surface area of Wabamun Lake produces micro-climatic effects upon the surrounding shore areas. Still the Moon Lake and Edmonton Industrial Airport data (Tables 5 and 6) will give the general climate conditions of the lake. Like Lesser Slave Lake, Wabamun Lake has an east-west orientation so that a 12 mile fetch is offered the westerly winds. These winds produce a slight water build-up on the southeastern end of the lake where waves often exist even when the rest of the lake is nearly calm. By contrast, the protected nature of the northeastern bay adds greatly to its attractiveness and is one of the reasons for the development of Wabamun Provincial Park there. Small craft can navigate within this inlet, without fear of the hazards of the open lake.

Many of the cottage owners at the northern end of Seba Beach[11] feel that the height of land directly behind their lots is a micro-climatic asset, despite its limitations to backshore development. Offshore winds are quite common along this western corner of the lake, but the bluff on the lake's northwestern shore affords protection against these winds. Thus, an area of relative calm lies immediately below the slope while several hundred feet from shore, the down draught usually makes for good sailing. The backshore bluff provides protection along

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[11] Pers. comm. anonymous cottage owners, East Seba Beach.

approximately one half of the lake's north shore; however, the converse is true for a good part of the south shore. The westerly and northwesterly winds blow frequently onto the southern shore. This explains the accumulations of coal sediments and scum from West Village to the area near Sundance. It is fortunate that shore unit quality is very poor in the southeastern corner of Wabamun Lake. The greatest wave formation occurs there and refuse is driven into the bay from other parts of the lake.

In winter, the winds trend more from the north, northeast and east. The lake is then frozen except for the area near the water outlet of Calgary Power's thermal electric station and the modifying effects of the open waters of summer are lost. The unobstructed ice surface allows the driving northeast winds to hit the southwestern and southern shores in the same manner as at Widewater on Lesser Slave Lake. Very few, if any cottagers stay at Wabamun Lake in winter. Only the small group of hardy ice fishermen brave the cold north and northeast winds on the lake's unsheltered ice surface.

In the ice-free periods the lake has a moderating effect on the climate of the shore area. This has both advantages and disadvantages for recreation, as Critchfield has noted:

> Water bodies aid in reducing diurnal and seasonal temperature ranges and generate breezes. If they are too shallow, however, they warm readily and thus create oppressive relative humidities in their vicinities in summer. In winter in the middle and high latitudes, shallow lakes and ponds may freeze rapidly losing their moderating effect.[12]

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[12] H. J. Critchfield, General Climatology, Englewood Cliffs, N.J., 1961, p. 380.

Water temperatures are extremely important to water-based recreational activities, such as swimming, bathing, water-skiing and fishing. The Alberta Fish and Wildlife Division collected water temperature data at Wabamun Lake over a period of several months in the summer of 1963. Their readings were taken at several different places on the lake, to provide a reasonably comprehensive picture. Reference to Table VIII reveals that Wabamun Lake is similar to Lesser Slave Lake in its warm, shallow layer of sun-warmed water along the beach areas. Offshore waters are cooler as the winds cause mixing of bottom and surface layers. Temperatures vary only slightly throughout the 20 to 25 feet of depth.

TABLE VIII

RANDOM WATER TEMPERATURES AT DIFFERENT DEPTHS IN WABAMUN LAKE

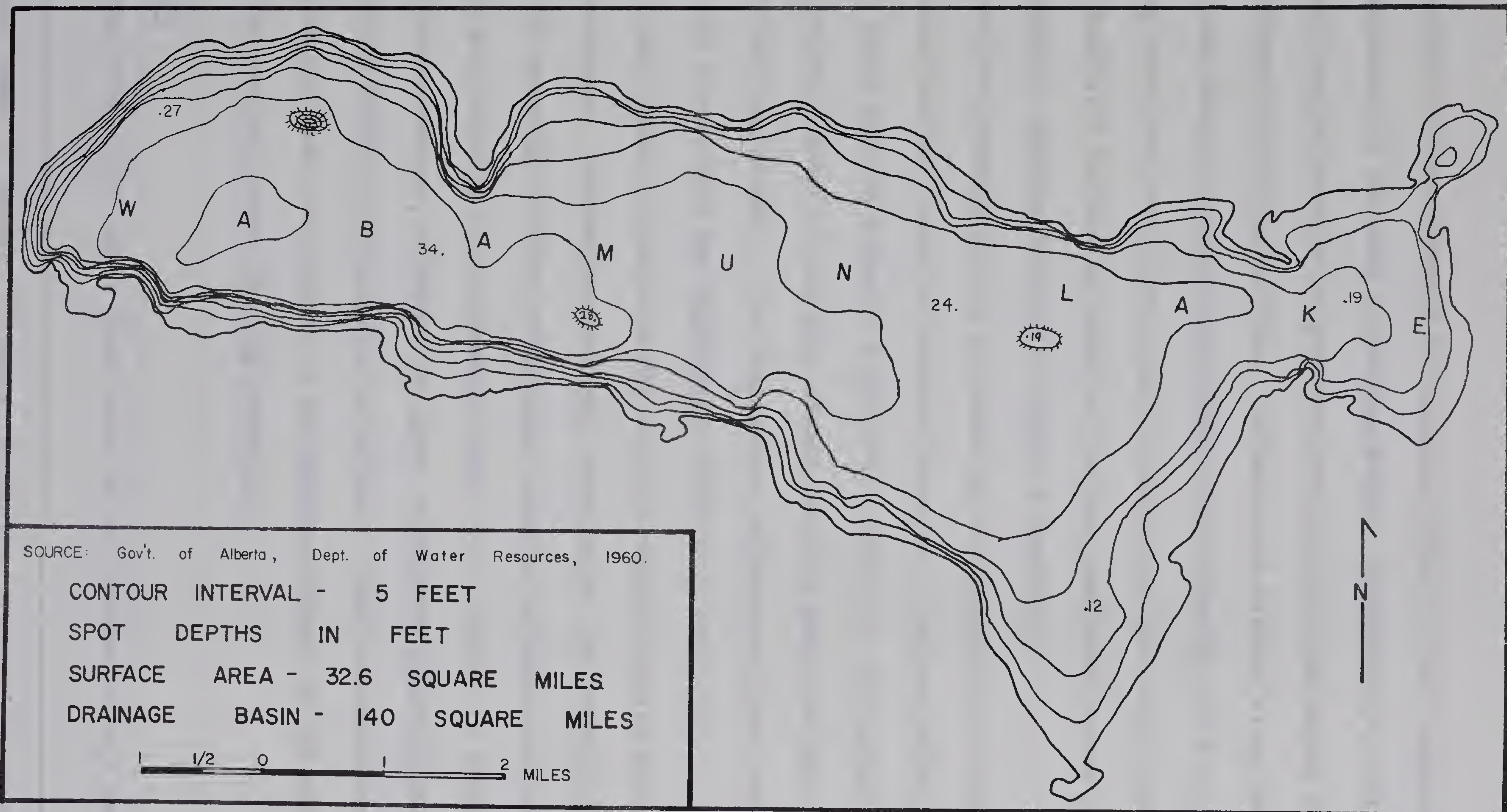
Depth (Feet)	July 19	July 24	Aug. 5	Aug. 14	Aug. 30	Sept. 7
0	68.9° F	70 ° F	67.5° F	70.2° F	63.7° F	66.7° F
5	66.9° F	68.2° F	67.4° F	70.2° F		65.3° F
10					61.2° F	
15	66.8° F	67.6° F	66.8° F	70.1° F		64.6° F
20					60.8° F	64.4° F
23	64.7° F		66.7° F	68.6° F		
25		67.5° F				64.4° F
27					60.8° F	

Source: Data from report of Dennis McDonald, Fish and Wildlife Division, Alberta Department of Lands and Forests. Recorded at several different locations varying from 28 - 32 feet deep. Readings were made at only one location on any one day.

Like Lesser Slave Lake, Wabamun Lake is also relatively shallow. Its maximum depth is 36 feet while the mean depth is only 20 feet. Wind-controlled mixing of waters in the lake's gently contoured basin (Figure 11) leads to a relative homogeneity of water temperatures. The bottom waters are therefore comparatively warm and support a luxuriant growth of plants and a subsequent high sport fish population. Perch and pike, in particular, thrive in these warmer waters. Water mixing moderates the bottom temperatures and cools these at the surface. At Lesser Slave Lake this phenomenon contributed to water temperatures which were generally too cold for swimming and bathing. Only shallow beach zones were adequately warmed by the sun. This is true of Wabamun Lake too; although a high proportion of the lake area is less than five feet deep (Figure 11), this means that the warm water zone is correspondingly larger. Wabamun Provincial Park borders the very shallow bay on the lake's northeastern corner. Extensive dredging, weed clearing and beach building were required to develop the park on this naturally weed choked inlet. Now that the development is complete however, the shallowness of the bay is a major advantage since its water is kept warm throughout the summer.

Swimming and bathing are very popular along this gently sloping wet beach zone. Figure 11 shows that the most extensive areas of water less than five feet deep are located in the eastern, and particularly the southeastern parts of Wabamun Lake. Water mixing due to wind-developed wave action, is also greatest there, but the cooling effect of mixing is more than offset by the solar heating of the shallow water. Conversely, the western and northwestern lake shores have the greatest offshore gradient. Westerly winds are least effective in wave generation at this

Figure II SUB - MARINE CONTOUR MAP OF WABAMUN LAKE



end too, so that the water mixing is lessened. This in turn compensates for the narrowness of the band of shallow water. Consequently, a five foot surface layer of warm water pervades even out into the deeper offshore waters of Wabamun Lake's western end. Swimmers and bathers along this shore from Seba Beach to Fallis enjoy beach zone waters of 70° F to 72° F. Even in deep water the warm surface layer remains, so that water temperatures are generally as warm as those in the much shallower waters off Wabamun townsite, Wabamun Provincial Park and Kapasiwin.

A localized warming effect is caused by the effluent from Calgary Power's thermal electric plant at Wabamun townsite. Fish and Wildlife officials[13] state that this has no significant effect on the ecology of the nearby waters, except in the late summer and fall when the lake level has fallen appreciably. The temperature differential then can be as much as 20° F, and this has significant effects on the biotic community. Some types of fish even die as they cannot tolerate such temperature changes. Recreation is doubly affected by the thermal plants' effluent. The warming of water off Wabamun townsite brings an explosive weed growth, particularly in mid-summer (Plate 20). Boating is difficult in the weed-choked waters, although the great vegetative growth promotes fish populations which are attractive to anglers. Pike and perch abound in the warm waters near the outlet, so the negative effect of the weeds is balanced by the high sport fishing potential.

D. Vegetation

Wabamun Lake, like Lesser Slave Lake is well endowed with a good

[13]Pers. comm. G. Haugan, Fisheries Biologist, Fish and Wildlife Division, Edmonton.

vegetative cover throughout its surrounding area. The eastern and southeastern shores of the lake are backed by a dense forest of trembling aspen (Populus tremuloides) with periodic white spruce (Picea glauca) intrusions. Some birch (Betula Papyrifera) occurs in the more poorly drained kettles, while black spruce (Picea mariana) and Labrador tea (Ledum groenlandicum)[14] are typical of the wet bog and marsh zones that fill the old drainage channels. Marsh reedgrass (Calamagrostis canadensis), various rushes such as (Juncus effusus) and willows (Salix) are characteristic of the inundated lands. Thus, the large marsh at the lake's extreme southeastern corner abounds with wetland grasses, while willows line the water's edge and cover the small marsh islands.

Vegetation is a very important indicator of recreational capability on both shorelands and uplands. Therefore, it is usually correct to assume that when Labrador tea, black spruce or sedges are found, drainage is poor, and the resulting muskeg or bog area has almost no capability for recreation. Wetland wildlife hunting and viewing are likely to be the only attractions, although the presence of the wetland areas also provides variety within an otherwise monotonous forest. Dense stands of aspen poplar such as those about Wabamun Provincial Park, are distinctive indicators too. These trees are found only on well drained ground and, for this reason, a backshore endowed with poplar indicates a high potential for the development of recreational facilities.

Along many of the beach areas of the lake, particularly in the the Wabamun Provincial Park bay, weeds and rushes cover the wet beach

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[14] Loc. cit.

zone. Extensive clearing of these weeds, backshore drainage and beach filling were required to develop the park to its high recreational capability. Nevertheless, weeds are still evident along the western side of the bay and at many other shore areas such as Wabamun townsite, at Sundance on the southern shore, in front of the YMCA Camp, and at Oseba sub-division. Often the occurrence of weeds and willows indicates a sandy bottom so that frequent cutting and clearing may be all that is required to create a beach with a high capability.

Nevertheless, muddy bottoms are more common as a base for rushes and reed growth. Usually the more silty a sand beach becomes, the greater the weed growth. Offshore water weeds thrive on these rich sediments too, making boating difficult and swimming dangerous. Summer waters tend to be very murky, as the seeds and algae bloom associated with the dense underwater weed patches turn lake waters to almost a green color. Weeds are negative indicators of beach capability, although frequent cuttings and clearing can remove the nuisance of vegetation at the water's edge. Moreover, the action of cutting weeds can help to sack and clean a soft bottom.

In the discussion on surface configuration it was shown that the present vegetative cover of the northern side of Wabamun Lake varies from a deciduous forest in the Wabamun Provincial Park area to a zone of mixed forest and cropland in the west. Agriculture is very evident to the southwest of the lake too, although the upland within two miles of the lake remains more in trees than in farmland. This diversity of vegetative cover adds much interest to the littoral of Wabamun Lake.

E. Fauna

Fish and wildlife contributes to an area's recreational capability in two ways. Hunting and fishing are direct or active recreation activities while faunal viewing is a passive enjoyment. Nevertheless, both activities demand a representative fish and wildlife resource.

Wildlife in the Wabamun Lake area is limited to the smaller mammals and to wetland and upland birds. White-tail deer and mule deer are found in small numbers, particularly north and east of the lake in forest and bushland. Moose, too has been known to inhabit the marshy eastern littoral, but the numbers are very small. Birds provide the greatest faunal contribution to Wabamun Lake's recreational capability. The southern and especially southeastern shores of the lake give good waterfowl production throughout the murky zones, while the many pot-holes and kettles east of Wabamun Lake are also important breeding and feeding areas. Ducks are the only numerous waterfowl. Hungarian partridge, sharp-tailed grouse, native ruffed grouse, and pheasant inhabit the drier upland areas. Pheasants are marginal to the area, however, so their numbers are fewer than the other game birds.[15] Edmonton is favourably situated within one of North America's best game bird areas. The Mundare-Beaverhill Lake area east of the city attracts hunters from all over the province, and even the continent, so that a moderately capable area, such as around Wabamun Lake, is often neglected. Indeed, hunting plays only a minor role in the recreation activities of the Wabamun Lake region.

Fishing is important in Wabamun Lake. The small fishing industry harvests about 300,000 lbs. of perch, pike and lake whitefish annually.

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[15] Loc. cit.

The last is the most important commercial fish. In 1955-56, a record 1,060,000 lbs. were taken commercially, but the catch has diminished since. Over-fishing became a critical problem in 1964-65 when only 7,000 lbs. were taken from the lake. Government quotas and restrictions then had to be tightened. The industry is based on portable cleaning and filleting units, and only small boats are used. Fish and Wildlife officials[16] state that commercial fishing returns from Wabamun Lake are of much less significance than the potential in sport fishing. Wabamun Lake's proximity to Edmonton is a major factor in its role as an angling lake. Fish numbers are large, though quality fish such as trout are absent. Lake whitefish (*Coregonus clupeaformis*), perch (*Perca flavescens*), and pike or jackfish (*Esox lucius*) are the major angling fish. Their natural reproduction is so great that restocking has not been needed for more than five years.[17]

Gordon Haugan, Fisheries Biologist with the Fish and Wildlife Division, Alberta Dept. of Lands and Forests summarized Wabamun Lake's biotic condition. He described it as highly eutrophic. That is, it is a very shallow lake in the last stages of its life history and now reaching the peak of its fish productivity. Temperature conditions in the shallow waters of Wabamun Lake are now ideal for perch, pike and bottom feeding whitefish. Their numbers are expected to increase at least for the next few decades. Fortunately too, they are very desirable species for sport fishing. They are easy to catch and yet provide a good fight once they

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[16] *Loc. cit.*

[17] *Loc. cit.*

are hooked. Lake trout, by contrast, are absent from Wabamun Lake as they are oligotrophic, requiring water temperature stratification. Walleyes do not thrive in this lake either, as suitable spawning grounds are not available.

One element of Wabamun Lake's water-based fauna negates the lake's capability. This is the Swimmers Itch (Schistisoma dermatitis) which is a periodic nuisance to tender-skinned swimmers and bathers. This parasite is carried to the lake by migratory ducks and is then localized in lake weeds by snails which act as secondary hosts. Clearing of beaches and removal of offshore weed banks alleviates this nuisance, although total erradication is impossible. Chemical control is out of the question as pesticides harm the fish population.

Even in winter, some of the fauna of Wabamun Lake support recreation activities. Ice fishing for whitefish is popular despite the poor catches. Nearly all the anglers come from Edmonton and, if the ice-fishing is poor, many of them take advantage of the flat open ice expanse for power tobogganing. This relatively new winter sport is catching on strongly throughout Canada, and Wabamun Lake's ice surface and surrounding upland provide ample opportunity for it.

Wabamun Lake should enjoy an increase over the next 20 to 50 years in perch and pike populations. After that a decline will set in as the lake gradually fills in and dies. The Wabamun Provincial Park bay demonstrates this filling in by weeds and a general shallowing of water. Major clearing and dredging is therefore required to keep the entire lake, and especially this northeastern bay, open for fishing, boating and swimming. Thus the recreational capability of Wabamun Lake depends on

several factors for its future. Winds are mixing the waters of the shallow basin; dense weed growth is gradually spreading throughout the lake; and angling potential and water quality are subsequently affected. Wabamun Lake's physical resources are numerous; however, their use for recreation demands that extensive and often costly developments be undertaken.

CHAPTER V

THE RECREATIONAL CAPABILITY OF WABAMUN LAKE

Diversity in recreational capability highlights the Wabamun Lake area. Nevertheless, the situation is much different to that at Lesser Slave Lake where units vary from Class 1 to Class 7 capability but there are very extensive occurrences of the highest ratings. In contrast, Wabamun Lake is deficient in high quality areas. It has no Class 1 beach, and only two Class 2 shore units. Class 3 and 4 shorelands are more the norm, and lengthy stretches of the shore have been given even lower ratings.

Wabamun Lake is intensively used by cottagers. Most of the northern shore and a good part of the southern shore have been developed. Demand is forcing use of poor capability areas. Furthermore, local improvements can change a beach area into several units of varying capability. Wabamun Lake displays a great number of shore units, and because of this variety each area tends to be small in size.

Wabamun Lake's recreational capability is presented in this chapter in a similar manner to the discussion on Lesser Slave Lake. The entire lake has been classified for recreation according to the Canadian Land Capability Classification for Outdoor Recreation.[1] This capability has been mapped in Figure 12. Detailed descriptions are also given for part of the lake (Figure 13) which has been chosen to typify its capability. In this way it will be possible to bring out (i) the associations of physical qualities which characterize the representative capability units,

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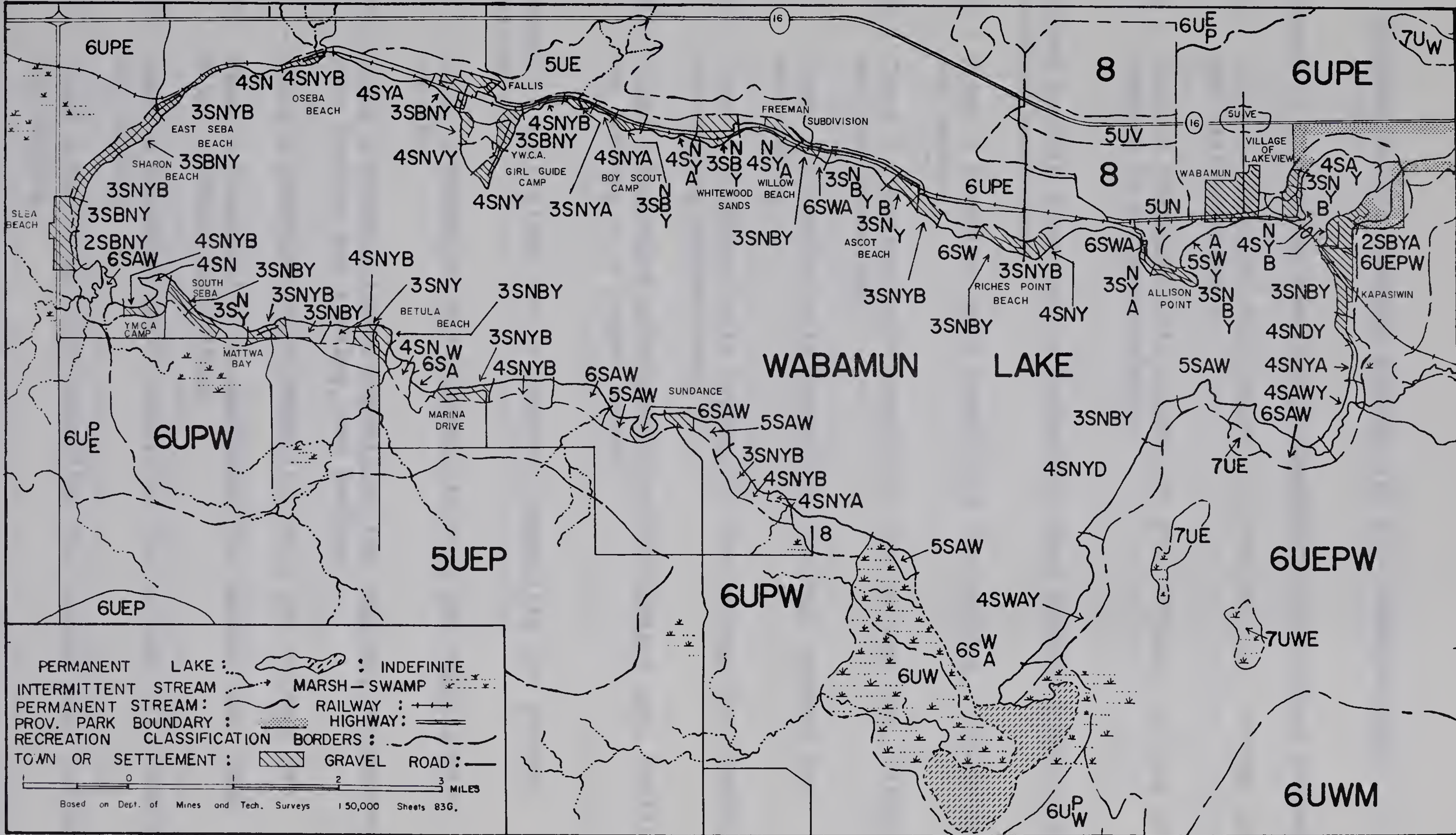
[1]See Appendix A.

Figure 12

RECREATIONAL CAPABILITY



EXPLANATION TO ACCOMPANY FIGURES 12, 13 - WABAMUN LAKE

Class 2 - areas in this class have a High Capability for outdoor recreation.

2 SBNY - Class 2 Shoreland with capability for bathing, cottage use and lastly boating.

2 SBYA - Class 2 Shoreland with capability for bathing, boating and angling to a lesser extent.

Class 3 - areas in this class have a Moderately High Natural Capability for outdoor recreation.

3 SBNY - Class 3 Shoreland with capability for bathing, cottage use and boating.

3 SNBY - Class 3 Shoreland with capability for cottage use, bathing and lastly boating.

3 SNY - Class 3 Shoreland with capability for only cottage use and boating.

3 SNYA - Class 3 Shoreland with capability for cottage use, boating and angling respectively.

3 SNYB - Class 3 Shoreland with capability for cottage use, boating and bathing to a lesser extent.

Class 4 - areas in this class have a Moderate Capability for outdoor recreation.

4 SAY - Class 4 Shoreland with capability only for angling and boating.

4 SAWY - Class 4 Shoreland with capability for angling, wetland wildlife hunting and viewing, and boating.

4 SN - Class 4 Shoreland with capability only for cottage use.

4 SNDY - Class 4 Shoreland with capability for cottage use, deep water inshore and boating.

4 SNVY - Class 4 Shoreland with capability for cottage use, viewing and boating.

4 SNYA - Class 4 Shoreland with capability for cottage use, boating and angling.

4 SNYB - Class 4 Shoreland with capability for cottage use, boating and lastly bathing.

4 SNY - Class 4 Shoreland with capability for only cottage use and boating.

4 SNYA - Class 4 Shoreland with capability for cottage use, boating and angling respectively.

4 SNYD - Class 4 Shoreland with capability for cottage use, boating and deep inshore waters.

4 SWAY - Class 4 Shoreland with capability for wetland wildlife hunting and viewing, angling, and boating respectively.

4 SYA - Class 4 Shoreland with capability for boating and angling only.

<u>Class 5</u> - areas in this class have a Moderately Low Capability for outdoor recreation.

5 SAW - Class 5 Shoreland with capability for angling and wetland wildlife viewing and hunting.

5 SAWY - Class 5 Shoreland with capability for angling, wetland wildlife hunting and viewing, and boating.

5 UE - Class 5 Upland with tree cover.

5 UN - Class 5 Upland with capability for cottaging.

5 UPE - Class 5 Upland in transition with cultural development and some tree cover.

5 UV - Class 5 Upland with capability for viewing.

5 UVE - Class 5 Upland with capability for viewing and tree cover.

<u>Class 6</u> - areas in this class have a Low Capability for outdoor recreation.

6 SAW - Class 6 Shoreland with capability for angling and wetland wildlife hunting and viewing.

6 SA - Class 6 Shoreland with capability for angling.

6 SW - Class 6 Shoreland with capability for wetland wildlife hunting and viewing.

6 SWA - Class 6 Shoreland with capability for wetland wildlife hunting and viewing, and angling.

6 UEP - Class 6 Upland in transition, with tree cover and some cultural development.

6 UEPW - Class 6 Upland in transition, with tree cover, some cultural development and capability for wetland wildlife viewing and hunting.

6 UPE - Class 6 Upland in transition, with cultural development and some tree cover.

6 UW - Class 6 Upland with capability for wetland wildlife hunting and viewing.

6 UPW - Class 6 Upland with cultural development and capability for wetland wildlife hunting and viewing.

6 UWM - Class 6 Upland with capability for wetland wildlife viewing and hunting and frequent small water bodies.

Class 7 - areas in this class have a Very Low capability for outdoor recreation.

7 UW - Class 7 Upland with some capability for wetland wildlife hunting and viewing.

7 UE - Class 7 Upland with tree cover.

and (ii) the nature and significance of the great diversity of capability units which can be identified along the shores of Wabamun Lake.

A. General Review

Figure 12 reveals the generally mediocre quality of Wabamun Lake's recreational capability. Only Seba Beach and the beach at Wabamun Provincial Park are rated as Class 2, and even they suffer in comparison with similarly rated beaches at Lesser Slave Lake. Plate 12 shows Seba Beach's narrow dry beach and the dirty nature of the sand. In contrast, the Provincial Park's beach has clean beige to white sand and a good backland; however, its length is barely 500 feet so that it does not satisfy a basic criterion of the Class 1 category. Nevertheless, the completely man-made beach is the best shore unit on Wabamun Lake and its qualities other than length can be equated with the best shorelands on Lesser Slave Lake (Plates 13 and 3).

Generally the northern littoral from Kapasiwin around to Fallis and Seba Beach has the best beaches and shorelands. Sandy beaches are common, though many local nuisances and narrow backlands detract from the otherwise good capability. From Kapasiwin to East Seba Beach, the mainline of the Canadian National Railway parallels the North shore causing beach and backland disruption reminiscent of Lesser Slave Lake's southeastern shoreline. It is unfortunate that the easiest rail route is always at the water level as many acres of ideal recreation land are bisected or removed from use. At Kapasiwin, Willow Beach, the Ernest Poole Boy Scout Camp, Fallis, Oseba Beach and East Seba Beach (Figure 12) the railways isolates a narrow strip along the water's edge. Its width ranges from 100 to 500 feet. In most of these cases, sandy or till beaches attract cottaging recreationists,

Plate 11. Canyon Creek beach, Class 2 SBYN looking east.

Plate 12. Seba Beach, Class 2 SBNY looking north.

but development and road accessibility are greatly hampered. Furthermore, the high speed railway traffic creates a safety hazard for children from the cottages, while road traffic entering the isolated cottage sub-divisions is forced to use unguarded crossings, many of which are owned by the railway company. At Oseba Beach the ultimate in poor accessibility is reached. Cottages at this site must descend the very steep edge of the northern upland before threading through a culvert-like railway underpass (Plate 14). At Oseba Beach, the rail line is some 30 to 40 feet above the narrow strip of beach so that passing trains literally run above the few isolated cottages.

At the Freeman Sub-division the rail-line and road occupy the whole beach. The few cottages in the locality must be sited on the backshore across these communication lines. Boating and swimming are severely hampered by the railway embankment, and gravel from ballast and the embankment mixes with the natural beach sands. An extreme example of the limiting effect of the railway is afforded by a boat house which is built on stilts, so as to compensate for the steep slope of the embankment.

Whitewood Sands, the largest cottage area between Seba Beach and Wabamun, is bisected by the Canadian National Railway's mainline too, but the difficulties are not as extreme. The cottages here cover a gently sloping promontory. Some cabins line the water's edge, while others are cut-off by the track. Those on the landward side of the line must use the single rail crossing to reach the beach at the end of the road allowance (Plate 15). Beach accessibility is always limited when cottages are built in rows parallel to the water. The safety factor is the greatest problem created by the railroad at Whitewood Sands although

Plate 13. Wabamun Provincial Park Beach, Class 2 SBYA looking east.

Plate 14. Oseba Beach cottage subdivision, a Class 2 SNYB shore unit.

train noises are bothersome too, especially at night.

Coal Point, at Fallis, provides an interesting break in the generally straight northern shoreline of Wabamun Lake. The point was initially a bedrock controlled island which was gradually joined to the mainland through sedimentation and wave action. The bedrock still outcrops in the southern part of the point which rises nearly 100 feet above the lake to provide a spectacular mid-lake view point. By contrast, the low isthmus between Coal Point and the town of Fallis is poorly drained and unattractive for recreation development. The beaches on each side of Coal Point have sand, but they are unfortunately polluted by sediments which have been eroded from the exposed coal seams (Plate 16). At the YWCA Camp on the eastern side of the point, sand was brought in to improve the clay and till beach. Public organizations such as the YWCA, the Order of the Grey Goose and the Girl Guides who use the point, are able to take advantage of the relatively private shore and upland. Hiking and climbing are possible on the promontory, and the physical barriers of water on three sides and the railway on the fourth protects the area from outsiders. Road access is difficult to the sites on Coal Point, and an indirect route must be followed.

Development is less advanced on Wabamun Lake's southern shore, largely because it is not easily accessible from Highway 16, the main route from Edmonton. Only in the last ten years has cottage development been spurred by the heavy demand for sites, as the northern shore has become almost fully built up. Cottage sub-divisions are still fewer on the southern shore and are located only on high capability sites. The extensive areas of weedy and rough shorelands still remain in a virgin

condition. The uplands, which fringes the southwestern portion of Wabamun Lake, is sharply bluffed along many of the shoreland units. Often, cottages are built some 25 to 30 feet above the narrow dry beach and long staircases are required to link the backland with the water's edge (Plate 17). The abrupt rise is a disadvantage to cottagers, although many feel that it is offset by the view from above the water level. Mosquitoes are less prevalent up on the elevated backland too, as the westerly and northwesterly winds blow onshore and remove these insects. Sandy beaches are often present along the southern shore; however, most are narrow, and their use is often limited by the coal smudge and sediments drawn across from Coal Point.

From Sundance to Kapasiwin, shoreline capability along the southern end of Wabamun Lake is poor. Several small coal mines near Sundance have removed both shore and upland areas from recreational development. Furthermore, Calgary Power has announced that a large scale, open-pit mining development will soon begin on this site to supplement its Wabamun output. Marsh and muskeg account for the complete southeast corner of Wabamun Lake, providing only wetland wildlife hunting and viewing possibilities. Even fishing is poor along this weed-choked shoreland.

No recreation development has been accomplished along the lake shore from Kapasiwin to the southeastern corner. Inshore deep water and narrow gravel beaches make most of this littoral, while the undulating to rolling backland rises abruptly from the water's edge. The upland is also densely wooded. It is difficult to foresee any recreational development along the eastern shore because the land lies within the Wabamun Reserve 133A and is therefore removed from easy public access.

Plate 15. Whitewood Sands public beach, a Class 3 SNBY shore unit.

Plate 17. South Seba Beach, a 3 SNBY shore unit.

Plate 16. Coal sediments on the west side of Coal Point near Fallis.

Recreational capability over most of the Wabamun Lake upland is limited. Even the Lesser Slave Lake upland provided hunting and some skiing potential, but Wabamun Lake upland does not offer even this capability. Most of its immediate hinterland is gently undulating forest or agricultural land which afford little to the recreationist except some minor hunting potential. The morainic deposits southeast of the lake have more varied relief and greater viewing interest so they are rated as Class 5. The same consideration applies to the rugged upland behind Fallis and Whitewood Sands (Figure 12). Several points along Highway 16 offer panoramic views of most of Lake Wabamun's expanse. Like the southern end of Coal Point, they receive a view point (V) symbol, although their remoteness from the water limits them to a rating of Class 5.

A large area of the uplands behind Wabamun townsite has been excavated and generally made ugly by the extensive mineral workings of Calgary Power. As industrial land, it is not considered to have any recreational capability and is therefore rated as Class 8, according to the Canada Land Inventory, Recreation Classification. One feature of the mining operation does offer some recreational capability though. This is the giant power-shovel which is used in the strip-mining process. It attracts a great deal of attention from travellers on Highway 16.

From this general review, and the preceding chapter, Wabamun Lake's short-comings are evident. Development is intensive along much of the lakeshore, but proximity to Edmonton is the primary explanation, not physical capability. The following detailed studies of the extreme eastern shoreland and other areas, includes most of Wabamun Lake's typical and unique capability units.

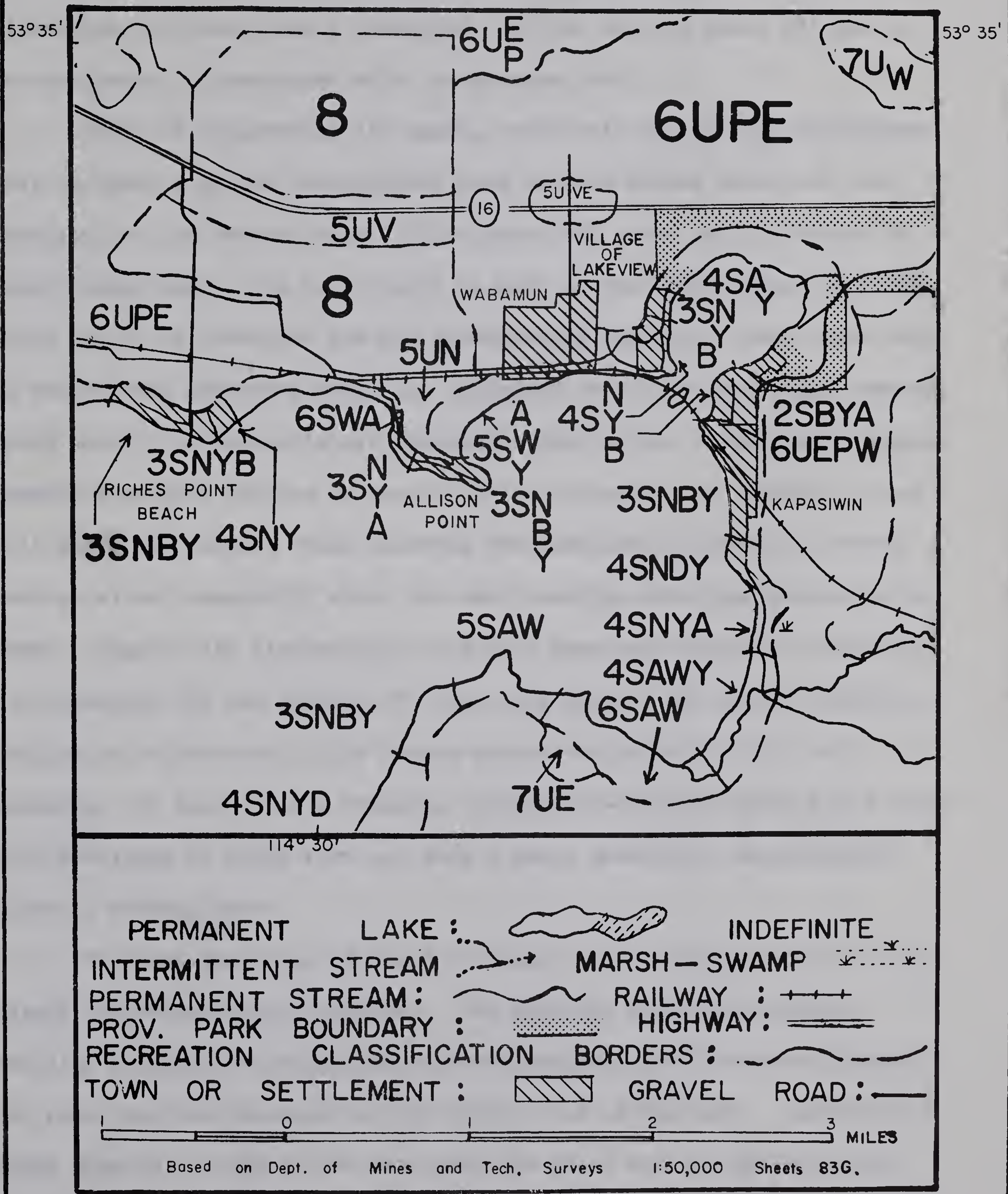
B. The Northeastern Shorelands of Wabamun Lake: A Case Study (Figure 13).

The first shoreland unit on the western edge of Figure 13 is a very poor, marshy area which is rated as Class 6SW. Clumps of willows cover a low-lying, badly drained lake terrace, and they along with rushes and weeds extend into the water. Only wetland wildlife hunting or viewing can be suggested for this unit, as terrace materials form a poor beach base.

Riches Beach, a cottage sub-division, occupies the small point to the east of the 6SW unit. The western half of the cottage area is classified as 3SNBY. Here, on a very low part of the lacustrine terrace, cottages have been built on drained and filled land. In places, there is good sand although the dry beach and backshore is mainly in lawns. Clay beaches exist locally, too, and there is a pleasant cover of mature aspens. Between the lawns and the water's edge, there is a strip of sand or clay, usually no more than five to seven feet wide. Offshore gradient is gentle, with a vertical drop of four feet in a distance of 100 feet. A few offshore weed patches hinder beach activities, although many cottage owners have cut and removed this nuisance. The high capability of this shore unit for cottage or lodge development causes the (N) symbol to be placed first in the formula. Beach conditions are sufficiently good for the bathing beach (B) symbol to be used, but as the beach unit is less than 300 feet long it has to be limited to Class 3. Boating (Y) is the third main attraction of the unit, and docks have been built along the gently sloping shore.

On Riches Point, itself, the beach materials deteriorate from the sand and clays of the 3SNBY unit, to dirty sand, till and organic debris. Aspen trees make up part of the cover but the presence of birches and willows indicates that drainage is poorer. The natural tree and bush

Figure 13 RECREATIONAL CAPABILITY of WABAMUN LAKE'S N.E. CORNER



cover has been opened up and cleared in some places, particularly around the row of summer cottages. Cottaging (N) and boating (Y) are the prime attractions of this Class 3 shoreland, but the bathing beach (B) has to be downgraded in comparison with the previous unit.

Plate 18 illustrates the small, relatively new cottage development that is opening up the transitional land between Riches Beach and the marshland on its eastern side. This Class 4SNY shore unit is backed by a small marshy area. The unit itself is part of the lake terrace of Riches Point and it is therefore low and inadequately drained. Lawns cover most of the terrace sediments about the cottages; at the water's edge, however, these underlying materials are exposed to wave action. Small sand lenses provide some good patches of beach, but the lakeshore is generally lined with weeds and rushes. Weed clearing has been done in front of several cottage sites, especially where the small sand patches give promise of a beach. Despite its limitations, this unit does have moderate capability for cottaging (N) and boating (Y) from long docks. The gentle gradient, shallow water and soft, silty bottom permit restricted bathing and swimming. In all, it is a marginal cottage sub-division which would never have developed if there were not such a heavy demand for recreational space at Wabamun Lake.

The next half mile of shore is almost lost to recreation as it is marshy and periodically inundated. The Canadian National Railways' mainline isolates the shoreland from the backland and the water intake of the power station accounts for the eastern end of the unit. Rushes and weeds grow out as far as 200 feet from the shore and the shallow water hinders boating. This area would be rated as Class 7, if it were not on

a lakeshore. Instead, its classification is raised to 6SWA. Wetland wildlife inhabit this marshy shore and sport fishing is a feature even though the weeds and rushes are impediments to boat access.

Point Allison is the next important feature to the east. It consists of a bedrock knob about 50 feet high and fringed by a spit-like lake terrace. This oddly-shaped promontory houses the cottage sub-division called Point Allison. Once again, the settlement is isolated from the landward area by the railway line. For this reason the small, low lying backland of the point was mapped as a distinct unit with a rating of 5UN. Many cottages (N) have been built on the low isthmus which makes up the backland area, but poor drainage limits the eastward extension of the cottage area.

The first shore unit on the western side of Point Allison has a very narrow dry beach area, as the backland rises steeply from the water line. Only the few cottages at the northern end of this unit enjoy a flatter and wider dry beach area. The rocky nature of the beach along this whole shore unit, and especially the few rushes and water weeds, are deterrents to swimming and bathing. On the other hand, the offshore gradient is relatively steep, dropping six to seven feet in a distance of one hundred feet, so inshore boating and swimming or diving from rafts are both popular. Angling is also possible. Most of the cottages on the southwest corner of Allison Point are perched high above the water on aspen-covered sites. The view down the lake is impressive, though the sites are rather exposed to westerly winds. In general, then, the unit has a moderately high capability for cottages, boating and angling, but its beach capability is poor. This evaluation is expressed in the 3SNYA rating

Plate 18. A Class 4 SNY shore unit on the east side of Riches Point.

Plate 19. Allison Point Beach, a Class 3 SNBY.

which has been applied to the unit.

At the southeastern end of Point Allison, the shoreline merits a Class 3SNBY. Here, the point is low-lying and drainage is inadequate, yet many very expensive summer homes have been built. The land has been filled and drained, and several cottages have low "sea walls" to protect them against inundation. The natural cover of willows, aspen popular and birch has been thinned and trimmed to provide pleasant surroundings for the high quality buildings. Most of the backshore is covered by lawns growing to the edge of the narrow, sandy, till-like dry beach (Plate 19). The offshore gradient is a very shallow three feet in 100 feet so motor boats with a deep draft are moored offshore. Several swimming and diving rafts are also anchored out from the shore. This shoreland, now that it has been improved, is well suited to family cottage or other lodging use(N). Bathing beach (B) quality is better than in the unit to the west, but boating (Y) is impeded by the shallow offshore gradients and must therefore be rated as the least significant of the unit's main attractions.

The next unit is another extensive marshland. It is a shallow weed-choked area which almost isolates Wabamun townsite from open water of the lake, although the long wharf shown in Plate 20 penetrates most of the densest growth. To compound the problem, the Canadian National Railways mainline and Wabamun yards occupy the immediate backshore of this unit, so that nearly all recreational capability is lost. Large rocks lie along the wet beach area and rushes and water stand up to three feet above the water surface and extend for 200 feet into the lake (Plate 21). They are particularly abundant at the height of summer, when growth

Plate 20. Wabamun town pier in a weedy shore area, Class 5 SAWY.

Plate 21. Dense weeds and rushes along the Wabamun town pier.

is promoted by the warm waters flowing into this bay from the power plant. Inevitably, boating is very difficult, though one Wabamun resident rents row boats from the dock (Plate 21). The offshore gradient is gradual in front of Wabamun townsite as the water is only four to five feet deep 100 feet from the shore. Angling (A) is particularly good in the warm waters about the power plant outlet. Many varying species of wetland wildlife inhabit the thick rushes, so wildlife viewing (W) is also popular. If it were not for these two attractions, and the availability of boating (Y) from the pier, this unit could not be rated as Class 5.

At the western end of the railway trestle bridge, the backland rises some sixty to seventy feet in a steep-sided knoll, around which are sited the cottages forming the Village of Lakeview (Plate 22). The shoreland here is classified as 4SNYB because cottaging is an ideal use of the backland, although it is slightly hampered by the slope. The offshore gradient is only three to four feet in 100 feet. Rushes are abundant at the water's edge and willows grow on the low-lying beach area. Poplars cover the higher, better-drained backland, while the low-lying backshore favours willows and mosquitoes. Boat houses are found periodically along the shore, and boating (Y) is a popular activity despite the poor access and the problem of navigation through the narrow openings in the railway trestle. Bathing (B) is severely limited by the weed growth on this unit, but cottagers from the backland area can use the narrow till beach cleared between the weed banks.

The adjacent 3SNYB unit to the north provides more direct access between cottage sites and the water. The backland rises gently from the water line to the higher level of the upland. Some cottage owners have

even cleared sandy or till beaches for boating (Y) and bathing (B). The backshore area was densely covered with aspen poplar so some clearing was required for development. Lawns are now grown to the narrow dry beach zone, but this shore unit is not yet as fully developed as the rather similar beach sites at Allison Point. Inadequate drainage on some of the backshore probably explains the more luxuriant growth and the slowness of improvement.

The next unit, which is rated 4SAY, lies within Wabamun Provincial Park. Weeds and rushes line most of its shoreline, although the backland has been improved from its natural state. The dense aspen forest has been thinned to provide road accessibility and park facilities. Plate 23 shows the more developed part of this unit, and occasional spruce trees can be seen within the aspen stands. Draining, filling, and the construction of a "sea wall" are helping to reclaim part of this till-based, weedy shore. The boat launch facilities at the park will be transferred to this unit after the reclamation work is completed. Sport fishing (A) is good along the shoreline, although the boat docking facilities (Y) may drive the fish away. This area is suited for boating as the gradient on the wet beach is a little steeper than usual, with a fall of five to six feet in a distance of 100 feet. The pleasantly terraced backland area would offer fine cottage sites if the unit was not in a provincial park.

The eastern shore of the northeastern bay has the greatest recreational capability on Wabamun Lake (Plate 13). The sand beach at Wabamun Provincial Park surpasses even Seba Beach in the quality of both sand and backshore. It is a Class 2SBYA unit, and accounts for the major share of the intensively used portion of the park. The whole unit has

Plate 22. The Canadian National Railways trestle and cottages in the Village of Lakeview.

Plate 23. New 'sea-wall' being constructed at Wabamun Provincial Park.

been thoroughly improved. Before 1955 when the park was conceived, only a marshy shoreline and a densely forested backshore with periodic areas of poor drainage existed. Today, the 500 feet long black area is cleared of its weeds and rushes and replaced by tons of beige coloured sand that had to be imported. The backshore vegetative cover is cleared in places and thinned elsewhere. Drainage of low areas and flattening of knolls facilitates picnicking and camping activities. Plate 13 gives some impression of the intensive use of the beach for swimming and bathing (B). The offshore gradient is an easy four to five per cent and the improved beach has a sandy bottom far out into the bay. Boating is very popular from the Government owned dock and a concrete ramp permits boats to be launched directly into the water from trailers. Fishermen are provided with good access to high quality angling areas from the boat dock. Thus, the unit merits the (A) symbol even though the popularity of other aquatic activities drives the fish some distance away from the shore.

Between the southern boundary of Wabamun Provincial Park and the railway trestle bridge is a small 4SNYB area. This unit has relatively poor capability since weeds and rushes grow about 50 feet into the bay. Furthermore, the till beach drops off with a steep gradient of ten per cent to a maximum depth of eight to ten feet. The Sea Cadets and United Church of Canada have camps in this unit. The Sea Cadets' site rises pleasantly into a thinned aspen cover, but the backland behind the Church camp is low-lying and densely forested. Both sites have small beaches cleared from the weeds, and even some sandy patches exist. Camp or cottage development (N) is the primary attraction, with boating (Y) in the deep inshore water surpassing the bathing and swimming (B) potential.

South of the trestle bridge is another unit where recreational use is limited by the mainline of the Canadian National Railways. Weed banks and rushes are nuisances near the bridge, but otherwise the unit has a good quality beach. The backland is generally low-lying, as Plate 24 illustrates, although the upland immediately across the rail line is quite undulating. A good aspen cover shelters the cottage lots, and lawns grow nearly to the water's edge. The narrow sandy dry beach marks the beginning of a very gentle offshore gradient of only three feet vertical drop in 200 feet horizontal distance. The long row of quality cottages attests to this unit's capability for such use (N). Moreover, the beach is well suited for swimming and particularly bathing (B). The boating symbol (Y) completes this good shore unit.

At its southern end, the 3SNBY unit is terminated by a 30 feet rise of the land above a rocky shoreline. This new unit is classified as 4SNDY since the abrupt rise of the backshore is a definite disadvantage to use. Plate 25 shows how boulders with an average diameter of ten inches cover the dry beach zone, while the impressive staircase is an indication of the sharpness of the local relief. The offshore gradient is very steep, permitting the use of the (D) symbol for deeper inshore waters suitable for swimming and boat launching. This symbol could probably have been used at Allison's Point too, except that the cottaging and boating attractions are more important there. The Kapasiwin shore unit offers good cottage sites on the crest of a bluff. The outlook is particularly impressive since the full length of the lake can be seen. As cottaging is a more intensive use of land, the (N) symbol precedes the (D) symbol in the 4SNDY formula, although the attractions are equally important.

Plate 24. Class 3 SNBY shoreland on northern end of Kapasiwin Beach.

Plate 25. Class 4 SNDY shoreland on southern end of Kapasiwin Beach.

The boating (Y) feature symbol completes the classification but it has the least capability at this shore unit.

The next unit to the south is classified as 4SNYA. Aspen and willows grow to the water line except in a few places where the till beach is exposed. The backshore is lower than the unit to the north, but it is also better drained than units further south, although small pot-holes and kettles in the morainic backland tend to be very wet. An Anglican outdoor camp occupies a small site across the road from the beach area but, elsewhere, development is in a neglected condition. The insect problem is severe in this heavily vegetated, rather damp area, although it could be alleviated through cottage development (N) and the associated clearing, draining and spraying. Boating (Y) and fishing (A) are possible, but the Class 4 rating indicates that the recreational potential here is low. As this unit is part of the Wabamun Indian Reserve 133A, recreational use of the shore may well be discouraged, although it is not actually prohibited by legislation.

Further south on the bayshore, weeds become even more of a problem, extending as much as 200 feet into the lake.

Weed and willow growth obliterate the wet and dry beach zones. The backland rises only three to five feet above the water line, while the intermittent depressions give a low, poorly drained character to the area. Wabamun Creek, the lake's outlet, meanders across the shore zone, but has no recreational capability. The unit is classified as 4SAWY.

The next units, 6SAW and 5SAW, account for the lakeshore south and west to the Indian Reserve Point. Willows line the water's edge. Indeed, the low, periodically inundated back shore is barely distinguish-

able from the marsh extending out some 150 to 200 feet on the gently sloping wet beach. Aspen mark the higher and drier zones of the backshore, while black spruce and Labrador tea typify the muskeg areas. The 5SAW unit is distinguished from the poorer Class 6 area only because of its position beside a higher, better drained unit. Fishing, wetland wildlife viewing and hunting are the only noteworthy features of these units.

On the western side of the point, by contrast, there is a 3SNBY unit which displays the highest capability of the whole southeastern shore of Wabamun Lake. This can be attributed to the presence of morainic deposits which are slightly elevated. The local relief is only ten feet, but this is sufficient to give a well-drained, aspen-covered unit with a high capability for cottaging (N). Small stones and pebbles form the beach area making swimming (B) particularly good. The beach dips at a steep 10 per cent gradient, which is an advantage for boating (Y) and for swimming and diving.

The final unit covered by Figure 13 is also a transitional area. This 4SNYD shoreland lies between the rise of land in the previous unit, and the extensive marshy lowland of the entire southeastern bay area. As in many of the other shore units, cottage and lodging use offer the greatest potential. Rocks and a slight weed growth discourage swimming or bathing. Boating (Y) and deep inshore water (D) provide the only other recreational attraction. This unit, like its neighbour to the north, has a dense aspen cover with intermittent spruce. The backland offers some local relief, although this is less pronounced than in the unit to the north.

To complete this inventory of Wabamun Lake's northeastern corner, a short discussion of the upland is required. Transitional land dominates the eastern end of the lake. Vegetative cover is still generally dense aspen poplar with an inter-mixing of spruce. Nevertheless, some clearing for agriculture, as well as for the shoreline recreation facilities, has added a cultural aspect to the otherwise natural vegetation features. A classification of 6UEPW is representative of the undulating backland. Local relief is not great enough to warrant a Class 5 rating while the wetland symbol (W) indicates the significant capability for wetland wildlife hunting or viewing in the many low-lying depressions and kettles of this eastern morainic area. Figure12 shows how extensive this (W) symbol is over most of the southern and eastern upland of Wabamun Lake.

The upland immediately north of Wabamun Lake has more cultural development and clearing than the forested area on the eastern littoral. Consequently, the (P) symbol for cultural landscape patterns precedes the vegetation symbol (E). The most common rating is 6UPE. Wetland wildlife is less prevalent than on the moraine, because drainage is good and pot-holes are few.

A large part of the northern upland in Figure 13 is included in Calgary Power's mining operations, and has therefore been given a Class 8 rating. Within this Class 8 unit, two small areas along Highway 16 have been classified as 5 UV and 5 UVE respectively. The panoramic views of the lake and its surroundings, which are offered from these highway locations, are the reasons for the (V) symbol and the Class 5 rating. The stark appearance of the 5UV unit within the strip-mining area, forces the omission of the (E) symbol for representative trees and vegetative cover.

C. Other Notable Lakeshore Units

The area covered by Figure 13 was chosen for detailed discussion because it contains the highest capability shore unit on Wabamun Lake. Furthermore, the other shorelands of the area range in capability from the almost useless Class 6 to the better quality Classes 4 and 3. The units which have been described are a representative sample of the types of shoreland prevailing along most of the lakeshore. Also, despite the diversity revealed, it was made abundantly plain that most of the units have serious recreational limitations which tend to differ more in degree than in kind. Such problems as limited beaches, poor drainage, weed infestation and shallow water are widespread, both in the study area and elsewhere around the lake. It therefore seemed that a detailed, unit-by-unit shore inventory on other parts of Wabamun Lake would be needlessly repetitive. There are certainly local differences which are quite significant, and this too has been brought out by the sample study, but the unit descriptions which have already been given could be applied equally well to most other sections of the lakeshore. The most meaningful conclusion to this chapter, then, is to concentrate on those remaining shoreland units which are notably distinctive from the types already described.

The first of these distinctive units is Oseba Beach, which is classified as 4SNYB. Plate 14 shows how the upland uses some 150 to 175 feet immediately behind the beach. On the right side of the photograph (the eastern end of the cottage sub-division) is the steeply descending gravel road which links this isolated shore unit with Highway 16. The railway line creates another problem by paralleling the lakeshore on a 30 feet high embankment above the cottage area. It is because of these problems of difficult access and limited backland that Oseba Beach has

been rated as Class 4. Willows line the water's edge and reeds grow out into the water in places. The recently built cottages are on lots which have been carved out of heavy aspen woods. Most of the backshore areas now in lawns, had to be cleared of willows and heavy grasses. The beach material is sandy or silty till and the bottom is soft. Width of the beach is only three to five feet. All of this shore unit required weed clearing and even some backshore drainage. The greatest recreational capability is offered for cottage use (N) although boating (Y) is another feature. As the offshore gradient is gentle, long boat docks are required. This is an advantage for swimming and bathing (B), but the dirty beach materials and soft bottom detract from these activities.

Also worthy of comment is the 3SANY unit at Sharon Beach (Figure 12) which occupies a narrow lake terrace similar to that at Oseba Beach. This is one of the four beaches on Wabamun Lake where the bathing beach (B) symbol can justifiably be placed first in the formula. The dry beach is five to ten feet wide and is composed of good quality, grey sand which dips at an offshore gradient of five per cent. Lawns and an aspen poplar growth cover the backshore and backland. Shore unit depth is restricted by the abrupt rise of the upland plateau, so that the tight-row of cottages and the access road fully occupy the terrace. Nevertheless, owners of these cottages feel little disadvantage from the bluff. On the contrary, most feel that it protects them against the usual westerly winds.

Seba Beach, another notable lakeshore unit, is the second best shoreland area on Wabamun Lake. It is rated as Class 2 like the Wabamun Provincial Park beach, but differs in many respects. The park beach has high quality clean sand materials, while Seba Beach is based on dirty,

silty, less pleasing sands. In the Canada Land Inventory Recreational Classification, however, the length of the beach is the major criterion. The Provincial Park beach barely exceeds the Class 2 minimum of 500 feet while Seba Beach is almost 1,000 feet long. On the other hand, backland conditions are aesthetically more pleasing at the park, even though those at Seba Beach are adequate. There is no doubt that the Class 2 rating is correct for each of these shore units, but it also shows that the classification permits considerable diversity within a single category.

Since the first decade of this century when Seba Beach opened, a resort settlement has grown haphazardly behind the extensive sandy beach, and much development has occurred. Still, this shore unit is less attractive than the Wabamun Provincial Park beach (Plates 12 and 13). Organic debris builds up on the water's edge. Beach materials are grey colored silty sands, which dip gently beneath the lake at a five per cent gradient. Most of the aspen cover has been cleared from the backland, although a narrow belt parallels the grass covered dry beach. Over-development by cottagers, permanent homes and commercial buildings (N) has turned the backland into an urbanized area. Still, the town of Seba Beach's dominant recreational role maintains it within the shore unit boundary. The beach length is nearly three-quarters of a mile; however, the northern half has rocky till beach materials and a two foot use on the dry beach zone. These two limitations are enough to drop the rating to Class 3. Despite these deficiencies, the bathing beach remains as the prime feature, while cottaging on the well-drained, slightly undulating backland is a secondary attraction. Boating is extremely popular along all this eastern littoral even though the shallow water demands that

long wharves be constructed from the shore. The Edmonton Yacht Club is based at Seba Beach. The lake waters are generally calm but the winds dropping on to the lake from the northwestern upland are strong enough for sailing.

From this description of the 3SBNY unit of Seba Beach and the earlier mention of Sharon Beach, similarities and differences in interpretation within one category can be noted. Both units have good bathing beach potential, as can be inferred from the (B) symbol. Nevertheless, Seba Beach experiences organic debris build-up along the shore and the beach materials are poor capability sandy to rocky till. In contrast, Sharon Beach has a good, gently sloping, sand beach and the narrow, restricted backland and backshore is the principal limiting factor. In both cases, the bathing beach attraction over-rides the less significant cottaging (N) and boating (Y) features. Thus, these two shorelands are equal in their classification but much different in their attractions and limitations.

South Seba Beach is the last unique shore unit requiring a detailed description. At this particular site the northern flank of the extensive southwestern moraine reaches Wabamun Lake. Backshore areas along this 3SNY unit rise abruptly at about 30 feet from the water's edge. No dry beach exists. Plate 17 displays the thick aspen growth upon the bluff and the contrasting open grasslands of the flat backland. The offshore gradient is a moderate 6 per cent with willows periodically growing at the water line. Reeds abound in patches offshore, so that clearing is necessary for easy boating (Y). Long staircases are necessary for access to the cottages on the high backland. This creates inconveniences but the

flat, dry nature of the elevated lots gives them good capability for lodging or cottage use (N).

This completes the shoreland description of Wabamun Lake. It remains only to provide a brief description of the northwestern and southwestern uplands. Figure 12 shows the broad belt of 6UPE upland which parallels the northeastern and northern shores of the lake. At Fallis this transition area of farmsteads and aspen forest widens out, so that the whole western end of Wabamun Lake, and the region northwestward towards Isle Lake, is classified as 6UPE.

Another noteworthy feature of the area north of the western end of Wabamun Lake is the 5UE backland unit. Here the scarp slope rises 150 to 175 feet from the lake terrace to the plateau above. Exposures of sandstone and glacial materials add variety to this rugged landscape, while a dense cover of aspen and low bushes clothes the less steep sites. Plate 16 gives some suggestion of this sudden rise, although the view is distorted by the foreground vegetation. This abrupt rise tends to isolate the lakeshore from its hinterland, even though the variety in local relief adds a certain appeal.

One to one and one-half miles south of Wabamun Lake's southern shore, an undulating to hilly area breaks the otherwise flat plain. A good deal of agricultural clearing has occurred, despite the variations in local relief. The Class 5 UPE rating indicates the diversity of landscape on this morainic deposit. Spatial transition is the keynote of this mixed agricultural and forest land.

As was mentioned in the description of fauna, the southern and eastern littorals of Wabamun Lake have a good capability for water fowl.

The (W) symbol for wetland wildlife indicates this potential. Most of the upland immediately south of Wabamun Lake is flat farm land, so 6UPW is a sound classification. The cultural landscape symbol (P) precedes the wildlife symbol (W), as it is the marshland and immediate shoreland of the southeastern part of the area that is most attractive to water fowl. Hunting and viewing potential is good throughout the 6UPW upland unit. In general, though, Wabamun Lake's upland region offers a mediocre to poor capability for recreation. The vegetative cover varies from a dense mixed-deciduous forest to open agricultural land. Relief ranges from flat table land to undulating and hilly moraine. Its capacity for intensive recreational use is negligible even though the landscape is aesthetically pleasing.

CHAPTER VI

THE INTERACTION OF RECREATIONAL CAPABILITY, ACCESSIBILITY AND USE

A study of the recreational capability of a land area or water body is valuable only when it is related to use. Furthermore, the use which is made of any recreational resource is as much, or more, a function of the physical qualities of the resource. Therefore, to put the discussion of the recreational capability of Wabamun Lake and the eastern half of Lesser Slave Lake into a human perspective, factors of distance, road conditions, travelling time and use must be related.

A. Conditions of Accessibility

Reference to Figure 1 indicates the situations of Wabamun and Lesser Slave Lakes with respect to Edmonton. At the time that field work was undertaken at Lesser Slave Lake (July and early August, 1966), the town of Slave Lake was 162 road miles northwest of Edmonton. At the time of writing (spring and early summer 1967), the new highway was open from Hondo to Slave Lake, so that seven miles have been cut from the distance. Road conditions have changed with the opening of this new road. Now, a wide gravelled surface, on a base course intended for eventual paving, stretches from the end of pavement at Chisholm Tower, some 41 miles directly to the eastern end of Lesser Slave Lake. The narrow, winding, extremely rough gravel road (Plate 26) via Smith is no longer the only route between the Athabasca Valley and Lesser Slave Lake. The slight reduction in mileage, then, has brought a marked improvement in travelling time. Traffic can travel the wide straight highway at speeds unknown on the older, more sinuous route. Alberta Government

Department of Highways officials have promised the residents of Slave Lake that the pavement will reach their town within three years. Hard surfacing is scheduled to cross the Athabasca River in the fall of 1967 so the promises appear likely to be fulfilled. The four hour journey between Edmonton and Slave Lake journey has now been cut to slightly more than three hours. With the completion of the pavement, the normal driving time will be rated less than three hours.

In contrast to the northern lake, Wabamun Lake is situated only 44 highway miles west of Edmonton. Furthermore, Highway 16, the direct road link, is a four-lane divided highway for 38 miles of the route. For the remainder of the distance to the northeastern corner of Wabamun Lake, and along the northern shore it is a fast, straight, two-lane paved highway. Even Seba Beach at the western end of the lake is only 60 - 65 minutes from the city. Therefore, it is evident that Wabamun Lake has a great advantage over Lesser Slave Lake in terms of accessibility from the principal population centre of Central Alberta.

B. Quantitative Comparison of Recreational Capability

From the preceding descriptions of the recreational capability of Wabamun Lake and the eastern half of Lesser Slave Lake, it is obvious that both lakes show great diversity. Lesser Slave Lake has shoreland units varying from Class 1 to Class 6 while the range at Wabamun Lake is from Class 2 to Class 6. No Class 7 shoreline units exist on either lake, as the presence of the water body is enough to raise a Class 7 muskeg or marshland to a Class 6. Upland capability at the northern lake is limited to Class 4 to Class 7 and the region about Wabamun Lake shows even less diversity in the Class 5 to Class 7 units. Comparison of the

TABLE IX

RECREATIONAL CAPABILITY SHORE UNITS ON WABAMUN LAKE AND THE EASTERN HALF OF LESSER SLAVE LAKE

	Number of Units	Shoreline in Miles	Acreage (Approx.)	Number of Units	Shoreline in Miles	Acreage (Approx.)
	The Eastern Half of Lesser Slave Lake			Wabamun Lake		
Class 1	5	8.0	1280	0	0	0
Class 2	5	4.8	768	2	1.4	128
Class 3	20	28.8	4608	28	11.5	1104
Class 4	13	17.2	2752	25	13.1	1260
Class 5	4	12.5	1997	5	34	320
Class 6	5	9.9	1587	9	13.0	1148
Total Units	52	81.2	12992	69	42.4	3960
Extensive use areas (Class 5-6)*	9	22.4	3584	14	16.4	1468
Intensive use areas (Class 1-4)**	43	58.8	9408	55	26.0	2492

EXPLANATION: *Extensive use is a relative term describing a recreation feature or land unit which attracts and sustains only a low level of use in terms of persons per acre; or a type of recreation activity requiring a large area of land per person.

**Intensive use -- see Appendix A, Glossary.

recreational capabilities of these two water bodies required more than just verbal descriptions, however, Table 9 has been compiled as a summary of each lake's shoreland units. Only the shoreland areas are inventoried, as it was impossible to delimit upland units in such a way that they could be compared meaningfully. The chief problem is that they vary so much in their depths behind the lakeshore units. Morecver, the only units which have the capability to support intensive recreational use are the shorelands.

Each shoreland unit's length was accuragely measured, and acreages calculated with a .25 miles representative unit depth for Lesser Slave Lake and .15 miles for Wabamun Lake. Depths were obtained by averaging shoreland unit's widths. Lesser Slave Lake shore units tend to be relatively wide as the forests impose few restrictions to backshore penetration. Only the zone east of Canyon Creek along the rail line (Figure 5) is limited in depth, and this accounts for a small part of the total shoreline. The narrow .15 miles unit depth is used on Wabamun Lake because backland uses, and backshore bisection by the railway are limiting factors. Numerical facts alone indicate the generally mediocre to poor recreational resources of Wabamun Lake. For example, Class 4, 5 and 6 units together account for 29.5 miles (70 percent) of Wabamun Lake's 42.4 miles of shoreline. Most of the remaining lake front, (11.5 miles or 27 percent) is Class 3, and is therefore made up of units with only moderate attractiveness. Bathing, swimming and boating are the most popular features of any shoreland unit and perusal of Figure 11 reveals that the (B) and (Y) symbols are rarely placed first in any of the Class 3 classifications on Wabamun Lake. The small remaining section of shoreline comprises two very small Class 2 units. Wabamun Lake is thus strikingly deficient in high capability recreational areas. By contrast, Table 9 indicates that Lesser Slave Lake's eastern basis has a high recreational capability. Approximately 10 per cent of its total shoreline has a Class 8 rating, and this is exceptional in

Alberta.[1] When a lake bears five Class 1 units (each of which is more than one mile long) and also five Class 2 units (each slightly less than one mile long) it has an extraordinary high capability for shore based recreation. Class 3 shore areas account for a further 28.8 miles or 35 per cent, of the shoreline, and in contrast to Wabamun Lake, these units are generally of high capability. It was remarked that very few Class 3 units on Wabamun Lake had the bathing beach (B) as the primary attraction, but on Lesser Slave Lake it is the leading feature symbol. Good sand beaches are very common and often only the length makes the difference between a Class 3 and a Class 2 rating. Backshores usually have a high potential for the development of facilities too, and this adds greatly to the overall capability of the beach. Several shore areas on Wabamun Lake (Sharon Beach and East Seba Beach are examples) are so restricted by abrupt topographic rises, or by road and railway rights of way, that Class 2 beaches have been lowered to Class 3.

To complete this quantitative analysis, it is useful to compare the percentages of shoreland in intensive and extensive use in each lake. Class 1 - 4 units (intensive use areas) at Lesser Slave Lake make up 72.5 percent of the total eastern shoreline as compared with only 61.4 per cent at Wabamun Lake. In fact, the difference between the two lakes is greater even than these figures suggest. For example, Class 4 units comprise only 29.2 percent of the shoreline with intensive use capa-

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[1] In widespread experience with the Canada Land Inventory of Recreation Capability in Alberta, Class 1 shorelines have been found to be very scarce.

bility on Lesser Slave Lake while the comparable proportion for Wabamun Lake is 54.2 percent. Similarly, the Class 1 and 2 units, which have the greatest capability for intensive recreational use, account for 21.8 per cent of the intensive use shoreline on Lesser Slave Lake but only 5.4 per cent on Wabamun Lake.

C. Qualitative Comparison of Recreational Capability

At this stage in the contrast and comparison of the recreational capability of Wabamun Lake and the eastern half of Lesser Slave Lake it would be timely to use some specific shore unit examples. Since Class 2 to Class 4 units are the only intensive use classes common to each lake, the comparison must be restricted. It should also be remembered that Lesser Slave Lake is in almost virgin condition with very little development, whereas nearly 70 percent of the shore of Wabamun Lake is intensively improved. Thus, virgin beaches will be compared with greatly improved shore units. For purposes of the Canadian Land Capability Classification for Outdoor Recreation, any permanent artificial modification to physical capability is evaluated as though it was a natural part of the resource base. On the other hand, no allowance is made for the suitability of a unit for major modification. Only minor improvements, such as the removal of boulders or vegetation from a beach, are allowed to be entertained in the assessment of recreational capability. In the case of Lesser Slave Lake this is quite sufficient, since only minor modifications are required on its high class shoreline units. Because Lesser Slave Lake is almost completely undeveloped, it is difficult to make a visual comparison between it and Wabamun Lake. For instance, almost nothing has been done to clear its beaches of debris, rocks or

nuisance vegatation. An example is provided by Marten River Campsite formerly operated by the Alberta Forest Service and now part of the new Lesser Slave Lake Provincial Park. Plate 10 shows the Class 1 SBNY beach in front of this pleasantly situated camp, and it is very evident that willow growth detracts from the usable dry beach. Furthermore, 1966 water levels were high on the lake so that the dry beach was narrowed and the effect of the nuisance vegetation was greater. A simple process of clearing would convert the Marten River campsite beach into an unobstructed expanse of quality white sand. Here, the contrast with Wabamun Lake is obvious. The Wabamun Provincial Park beach, a Class 2 SBYA unit, has been totally developed by man. An inestimable amount of beige colored sand was imported to increase a previously marshy shore to a high capability unit (Plate 13).

Another vivid example of Lesser Slave Lake's primaeval state is provided by the alternating sandy and rocky beach zones on the extreme northern shore. Plate 9 illustrates a 4 SNAY shore unit which is littoral with large boulders and driftwood piles. The backshore rise is densely forested so that landward accessibility is difficult at present. Thinning of the forest, as was done at Wabamun Provincial Park (Plate 23), would increase the potential of this gently undulating back area. Some of the larger boulders could even be removed from this rocky shore to expose the finer cobbles beneath. The Class 4 SNDY shore at the southern end of Kapasiwin Beach on Wabamun Lake has developed from a similar situation. A height of land rises abruptly from the rocky dry beach area to an aspen covered upper level. Through the construction of staircases, rock picking and backshore forest thinning, this has been converted into a good cottage

area.

Plate 27 shows a Class 3 SNBY shore unit on the northern shore of Lesser Slave Lake. Willows along the dry beach and some inundation during the 1966 high water period detracts from its capability. The beach is composed of good grey to white sand, interrupted by patches of gravel. This is definitely a better quality unit than the narrow sandy till shoreland at Allison Point on Wabamun Lake, which has been given exactly the same classification. Cottage development at Allison Point has led to improvements through backshore drainage, reed clearing, tree thinning and the cultivation of lawns (see Plate 19). An attractive cottage area has thus been created,although Allison Point was distinctly inferior to the comparable unit on Lesser Slave Lake.

Backshore and backland areas at the eastern end of Lesser Slave Lake generally have better recreational capability than those on Wabamun Lake. The North Shore Campsite of Lesser Slave Lake Provincial Park (Plate 6) is a perfect example of high backshore capability. The shore unit, classified mainly on beach quality, rates only a 3 SABN. This beach has only gravel materials and small sand patches while offshore rocks and weeds are definite limitations. Tall poplars protect the camp from winds and road dust, and the fifteen feet rise to the backshore level aids drainage, prevents inundation and provides a view of the lake. In contrast, many Wabamun Lake beachshores are narrow, because of sudden upland rises (Plate 14) or poorly drained (Plate 18) or isolated from the lake by bluffs which obliterate the dry beach zone (Plate 17).

When the Lesser Slave Lake region is viewed from any height (Plate 1), the overwhelming impression is that it is part of a limitless expanse of untapped forest. The dense cover of coniferous and deciduous trees adds

Plate 26. Old Highway 2 between Slave Lake and Smith.

Plate 27. Class 3 SNBY shore unit on the north shore of the eastern half of Lesser Slave Lake.

much to the setting of the lake, by giving it a wilderness air which is an important element in its beauty and recreational appeal. Both the subject-lakes have uplands or rolling areas about their shores but the Lesser Slave Lake region in the heart of the bush surpasses the Wabamun Lake region in both the magnificence of its setting and its upland capability.

In the preceding studies of recreational capability, mention was made of fluctuating water levels and the detrimental effect which these have on the recreation resource. In this respect, Lesser Slave Lake is less favored than Wabamun Lake, since it experiences marked variations from year to year. In contrast, Wabamun Lake has little annual variation but tends to follow seasonal fluctuations, with high levels in the spring and low levels in the fall. Lesser Slave Lake has a mean lake level of 1892 feet above mean sea level, although a maximum of 1897.07 feet and a minimum of 1888.10 feet have been recorded. Wabamun Lake fluctuations are half as great with a 2372 feet mean, a maximum of 2374.22 feet and a minimum of 2369.76 feet above mean sea level.[2]

Water level fluctuations affect many aspects of recreation. Obviously, the beach areas are always the first to suffer, particularly if they have comparatively gentle gradients. On both Wabamun and Lesser Slave Lakes, a small rise above the mean water level can result in a drastic reduction in the width of the dry beach. In extreme cases, the beach may disappear completely for a time. Conversely, a slight fall

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[2] All lake level data from Department of Energy, Mines & Resources, Water Resources Branch, Water Resources Paper No. 145, Surface Water Data for Arctic and Western Hudson's Bay Drainage, Ottawa, 1966, 260 pp.

below the mean water level may expose extensive tracts of wet beach. Debris and weeds are often a disadvantage of a water level drop. Furthermore, longer wharfs are needed.

Rising water levels at Lesser Slave Lake rarely interfere with shore unit facilities as most backshores are sufficiently elevated above the beaches. The principal backshore problems occur at Wabamun Lake, where even a minor rise above the mean water level can endanger cottage and camp development on the flat lake terraces. Only a few units, such as those on the south shore as well as the Kapasiwin and Lakeview areas, have marked backshore rises which protect them against inundation. Indeed, it is fortunate that only modest water level fluctuations occur on Wabamun Lake.

Cultural landscape features provide a final point of comparison between Wabamun and Lesser Slave Lakes. The Canadian National Railways mainline bisects most of the shore units along the northern shore of Wabamun Lake. Similarly, the Northern Alberta Railways line parallels the southeastern shore of Lesser Slave Lake. The disruptive effect, however, is much more pronounced at Wabamun Lake, since many of its best shoreland units are seriously reduced in size and recreational capability.

The units affected by the N.A.R. line are generally of lower capability. They are also much less significant as potential recreational areas because of the wealth of high quality units elsewhere on Lesser Slave Lake.

Highways and roads are less of a detriment on either lake, even though they run parallel to many lakeshore units. Only the Wabasca road along Sand Dune Beach is a nuisance (Plate 7) and plans are in the offing for its eastward relocation.

The overwhelming negative affect to recreation of the strip mining on the northern shore of Wabamun Lake is soon to be duplicated on the southern shore. The upland areas which are lost to recreation can support only extensive use, but the environmental qualities of a large part of the Wabamun Lake setting have been hopelessly destroyed. This experience has fortunately not been repeated at Lesser Slave Lake.

Several Indian Reserves are located on the shores of Wabamun and the eastern half of Lesser Slave Lakes. Recreation development is not prohibited by law on these reserves; however, the social connotations involved limit any cottage or park sub-dividing. Townsites located along a shoreline also limit cottage development. The towns of Wabamun (Plate 21) and Canyon Creek (Plate 11) are typical examples. Roads and rail lines parallel both beach areas, while urban development removes the backshore areas from potential cottage building. Thus, cottage and park development must avoid urban areas, making use of only the rural shorelands.

In summary then, cultural limitations on recreational capability and use have left their marks on both lakes. However, the losses have been much greater at Wabamun, the lake that could less afford them.

D. Use on Wabamun Lake and the Eastern Half of Lesser Slave Lake

The use which is made of a recreation resource depends partly on its physical capability and partly on its accessibility from a large urban centre, from which the principal demand for recreational facilities emanates. As the two factors of recreational capability and accessibility have now been reviewed, it remains only to show how they react on the present use of Wabamun Lake and the eastern half of Lesser Slave Lake.

Analysis of the patronage survey which was discussed in the Introduction, revealed that Lesser Slave Lake is simply too far from Edmonton. Sixteen parties out of the twenty-nine who commented on this distance factor felt that Lesser Slave Lake's remoteness was a definite disadvantage to their visits. On the other hand, nineteen groups expressed the belief that paving of Highway 2 would encourage them to make more visits to the lake.[3] It must be remembered that all those sampled at Lesser Slave Lake were either local residents or people who had already travelled at least from Edmonton and, in some cases, from even more distant centres. Five United States parties were interviewed, for example, and it could have been expected that they would comment unfavourably on Lesser Slave Lake's remoteness and its poor access route. As it happened, they returned mixed opinions, as some liked to "rough it," while others preferred to travel on modern highways. It must also be realised that all the American parties were making deliberately planned visits to Lesser Slave Lake from Edmonton. This means that their responses to the distance question would not be disturbed by their having followed some alternative, much more time-consuming route.

Various activities were enjoyed by the visitors to Lesser Slave Lake's eastern shores. Fishing and swimming were rated highly by all types of visitors, while picnicking was a major attraction for the local populace and camping was important to visitors from more distant areas. Twelve of

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[3]The number of answers to each question varies as often a question would be unanswered. Slave Lake townspeople did not always reply to the effects of remoteness and road quality as they were already at the site.

the sample of thirty-six groups pointed to the natural beauty of the lake as an incentive to their visits. In general, they were referring to the beautiful beaches, although some mentioned the wilderness atmosphere of this isolated and largely undeveloped lake. Two United States parties stated that they had long wanted to go "up north" but had compromised on Lesser Slave Lake as the nearest they could realistically come to a taste of the north country in a vacation trip. For them it was a once-in-a-lifetime trip which gave them the feeling of being far from populated North America. To some visitors from Edmonton, too, the very isolation of Lesser Slave Lake was its major charm.

In an attempt to obtain another view of Lesser Slave Lake, cottagers at Wabamun Lake were questioned about their attitudes towards it. Only five of thirty-seven parties even showed interest in visiting the northern lake for a camping trip or tour. Thirty-five cottagers stated that the northern lake is too far for even a weekend visit so they would not want to make the journey. Distance alone was a sufficient deterent to these people; the inconvenience of a gravel road seemed to be regarded as no more than an additional irritant. Therefore, it is not surprising that only two groups expressed interest in the possibility of owning a cottage on Lesser Slave Lake. The thirty-five negative replies were all based on distance as the primary factor and the gravel road as a secondary factor. All the respondents also noted that moving to a new lake would be too much trouble. Indeed, from their statements it seems that once a cottage is bought at one lake, it is rarely relinquished for a better area. The investment and sentimental ties are too strong.

For further comparison, similar questions were put to visitors to

the Wabamun Provincial Park. It was found that eleven of the twenty-two parties who were questioned had not visited Lesser Slave Lake. All thought it was too far from the Edmonton area, but only one mentioned the fifty miles of gravel as a deterrent. Even more significant, ten of the groups who gave negative replies were almost completely uninformed about the physical capabilities of Lesser Slave Lake. When something of its high recreational quality was described to them, twenty-three parties in a total of twenty-six showed interest in visiting the area. In eighteen cases it was felt that complete paving of Highway 2 would encourage them to make the trip, and twenty-one parties were strongly attracted by the Lesser Slave Lake Provincial Park which is now being developed on the eastern lakeshore (Figure 5).

A question on the reasonable driving distance to a recreational area drew an interesting variety of responses. Wabamun Lake cottagers were the most conservative group, favouring an average distance of forty-five to fifty miles between home and cottage. Visitors to the provincial park, who included picnickers, weekend campers, summer campers, and transients preferred an average of 61.2 miles maximum driving distance, although response varied from 25 miles to 100 miles.

In contrast, groups interviewed at the campsites and beaches of Lesser Slave Lake were prepared, on an average, to travel 115.2 miles. This was an average, based on replies between 50 and 200 miles. Therefore, it can be concluded, that visitors to this northern area are a more ambitious, adventuresome type who are not affected as much by distance as by the quality of the area. Fourteen of the thirty-five groups in the Lesser Slave Lake survey rated the eastern half of the lake as good in its

recreational quality, while the remaining twenty-one put it in the excellent category. The high recreational capability of Lesser Slave Lake is therefore recognized by these visitors and is a major attraction to them. Only six of the thirty-seven patrons were from the local area.

Impressions by visitors to the Wabamun Provincial Park are less enthusiastic, even though it is the most highly classified shore unit of the lake. On twelve groups in a sample of thirty-one classified the park area, beach and lake as excellent, while seventeen ranked it as good and two as only fair.

Cottagers at Wabamun Lake have even more mixed feelings about the lake. In a sample of forty-one cottagers, nine responded with the subjective description of excellent, twenty-one rated it as good, but eleven considered it to be only fair.

In the next set of questions, visitors to both Lesser Slave Lake and Wabamun Provincial Park were asked if they were interested in the plants and wildlife of the park and its vicinity. It is encouraging that twenty-eight out of thirty-one at Wabamun Provincial Park gave an affirmative reply. The same number indicated that they would approve a concentrated nature program organized by a park naturalist. At the eastern half of Lesser Slave Lake, twenty-eight groups of the thirty-four interviewed stated that fauna and flora interested them, while twenty-six would like to see a park sponsored nature program started. Response to these two questions was very good at both lakes. Nevertheless, interest was greater at Lesser Slave Lake, probably due to the fact that visitors to the eastern shores of Lesser Slave Lake are more likely to be attracted to a wilderness situation where plant and animal life can still be viewed under conditions not too far removed from a completely natural state. Wabamun Provincial Park, by con-

trast, is highly developed and plant and wildlife associations have been strongly modified by man.

Activities enjoyed by visitors to Wabamun Lake are identical with those mentioned at Lesser Slave Lake. Single-day picnicking is of major importance to many Edmontonians using Wabamun Provincial Park. Many also stay for the weekend and camp in trailers or tents. Swimming, boating and fishing are the major attractions for both day and weekend visitors.

Cottagers at Wabamun Lake participate in boating and fishing from almost every cottage sub-division. Swimming is very popular too, though the participation varies with the specific beach. Water-skiing is a very popular activity on Wabamun Lake, particularly in the provincial park bay and along sheltered Seba Beach. Sailing also receives enthusiastic support. The Edmonton Yacht Club is stationed at Seba Beach, and an annual regatta there provides competitive sport for both yachtsmen and motor boat owners.

Recreational use of the eastern half of Lesser Slave and Wabamun Lakes is obviously influenced by the capability of each lake. The presence of usable beaches and water is enough to ensure this. If physical capability was the only determinant of use, however, it is equally obvious that the eastern half of Lesser Slave Lake would be much more heavily used than Wabamun Lake. Yet the converse is true. From the comparative analysis of capability and use, then, it must be concluded that accessibility from a major population centre is by far the more important factor in determining the degree of use which is made of a recreational resource.

The patronage surveys undertaken on each lake brought out that Lesser Slave Lake is considered to be too far from Edmonton to appeal to

most cottagers or weekend campers. Of the four summer cottages on Sand Dune Beach, two are used by Slave Lake residents while the other two are occupied by Edmonton families. It must be noted though, that Edmonton people reside at these cottages for the whole summer period except for occasional brief visits to the city. Certainly, the distance and travelling time are now considered to be too great for weekend commuting, even if the road was completely paved.

In view of these attitudes, the decision to designate a large provincial park on Lesser Slave Lake would seem to be a sound one. The greatest foreseeable demand is for facilities for day visitors from the local area, and for transient visitors who stop at Lesser Slave Lake while on tour, and for campers mainly from Edmonton, who wish to stay for periods longer than a weekend. All these interests can best be catered to through public ownership and development. The demand for cottage areas, by contrast, is minimal, especially when compared to Wabamun Lake. Nor is there any evidence that demand will increase substantially in the near future. It was learned that some local people wish to purchase land for cottages, but this desire seems to be stronger amongst transient workers in the petroleum industry than it is amongst permanent residents. At present, most of the northeastern and northern shores of the eastern half of Lesser Slave Lake are Crown owned. Therefore, the land is frozen for development until Provincial Parks Planning staff and other Department of Lands and Forests officials reach a decision on its best future use. Probably development will be restricted to the area northwest of Marten River, outside the provincial park. There are Class 1 shore units immediately northwest of Lesser Slave Lake Provincial Park and on the north side of the Narrows which

would make excellent cottage areas. Several Class 3 areas with high cottage potential also lie along this northern shore, so the lake is large enough and varied enough to provide ample space for both public and private development of the highest quality.

Although demand is still insignificant, it is fortunate that Lesser Slave Lake Provincial Park has been designated well in advance of need. Ten square miles of rich shore and upland recreation resources have been protected for the public, and the costly experience of Wabamun Lake will be avoided. Crown land was scarce in 1955, when the development of Wabamun Provincial Park was conceived. It was, therefore, necessary to convert a weedy stretch of inferior shoreland into a high quality shore unit, despite the cost. Subsequent use of the Park has justified its development, but it is still preferable to utilize areas of naturally high capability if these can be obtained.

Similarly, demand for cottage space along the shore of Wabamun Lake is forcing the use of marginal land. The better quality areas at Seba Beach, Kapasiwin and Lakeview Village were taken up as early as 1910, and the demand has accelerated rapidly with the growth of Edmonton over the past twenty years. Proximity to Edmonton has forced intensive development and use despite the modest recreational capability of Wabamun Lake.

CHAPTER VII

CONCLUSION

Use of a recreation resource is affected by the recreational capability of the resource, and its accessibility from an urban centre. This study has shown that the eastern half of Lesser Slave Lake has a very high recreational capability whereas Wabamun Lake has only a moderate capability. In terms of accessibility, though, the position is reversed. The town of Slave Lake, at the southeastern end of the lake, is more than three hours driving time from Edmonton, and part of the journey must be made on a gravelled highway. In contrast, Wabamun Lake is only 50 to 75 minutes from the city on a first class highway. Development and use are very intensive on Wabamun Lake, as the number of cottage sub-divisions attests. At Lesser Slave Lake, there is only a narrow, interrupted band of settlement along the southern shore, while the remainder of the region is generally in an undeveloped wilderness stage disturbed only by a few petroleum or forestry roads.

It is remarkable that five of Alberta's generally scarce Class 1 beaches are found on Lesser Slave Lake's eastern half. Furthermore, slightly more than 70 percent of the intensive use shorelands (Class 1 - Class 4) are classified as Class 3 or better.

Climate plays a major role in the recreational capability and use of Lesser Slave Lake. Wind and wave action, intensified by the east-west orientation of this long lake, have been responsible for much of the beach development, especially along the northeastern and eastern shores. Moreover, the winds have a cooling effect upon the surface layer of the lake,

as cold bottom waters are mixed with those warmed at the surface by the sun. On the other hand, the long summer days and the high incidence of sunshine allow the shallow beach-zone waters to warm, so that swimming and other water play can be enjoyable. It is unfortunate that the size of the lake and the strength of the winds make its water too treacherous for offshore pleasure boating and fishing. The high capability of the extensive beaches on the eastern half of Lesser Slave Lake, are the major attraction of the area, supplemented by the good sport fishing potential and the picturesque nature of the region.

Contrary to the high recreational capability of the eastern half of Lesser Slave Lake, Wabamun Lake has only moderate potential. It has no Class 1 shoreland units and only two small Class 2 beaches. By the same token, a much higher proportion of its shoreline is taken up by low capability units than is true of Lesser Slave Lake. It therefore, has less diversity of recreational capability, a phenomenon which is by no means unusual. A large lake such as Lesser Slave Lake, generally shows more extremes in capability than a smaller water body like Wabamun Lake. The size and number of shore units is different with each lake too. Wabamun Lake because of its intensive development, has more, but smaller shore units, then the northern lake.

Wabamun Lake is similar to Lesser Slave Lake in its geographical orientation and elongated shape. Westerly winds thoroughly mix the waters of this lake, too, cooling the surface layer. Still, a large area of shallow beach-zone waters is warmed by the sun, so that most water-based activities are pleasant in the summer months.

Wabamun Lake's high degree of cottage and recreational development

has brought some resource improvement through weed clearing, draining and filling. Wabamun Provincial Park beach, the most highly rated shore unit on the lake, has been totally man-made.

The other beach units, however, have not generally experienced such improvement.

Wabamun Lake is one of Alberta's most intensively used lakes, despite its fair to good capability, whereas the eastern half of Lesser Slave Lake has a good to excellent capability but is undeveloped. As yet it receives only limited use by inhabitants of the local area, and a few more adventuresome Edmontonians and through-travellers. Edmonton recreationists, both at Wabamun Lake and the northern lake, are almost unanimous in their belief that accessibility is the major factor in use. Lesser Slave Lake is simply too far from Edmonton for week-end camping or cottaging. Wabamun Lake is near to Edmonton and it is this proximity that seems to be the important factor in its recreational use. Furthermore, Wabamun Provincial Park has been improved to a state that ranks it near the top in the Alberta Provincial Park system. Crowding is the norm on summer weekends, particularly at the park but elsewhere along the lakeshore as well. There are still very few people who would sooner drive for three hours, partially over a gravel road, to reach an uncrowded, almost wilderness-like shore unit, even when it provides beaches as fine as those at Lesser Slave Lake.

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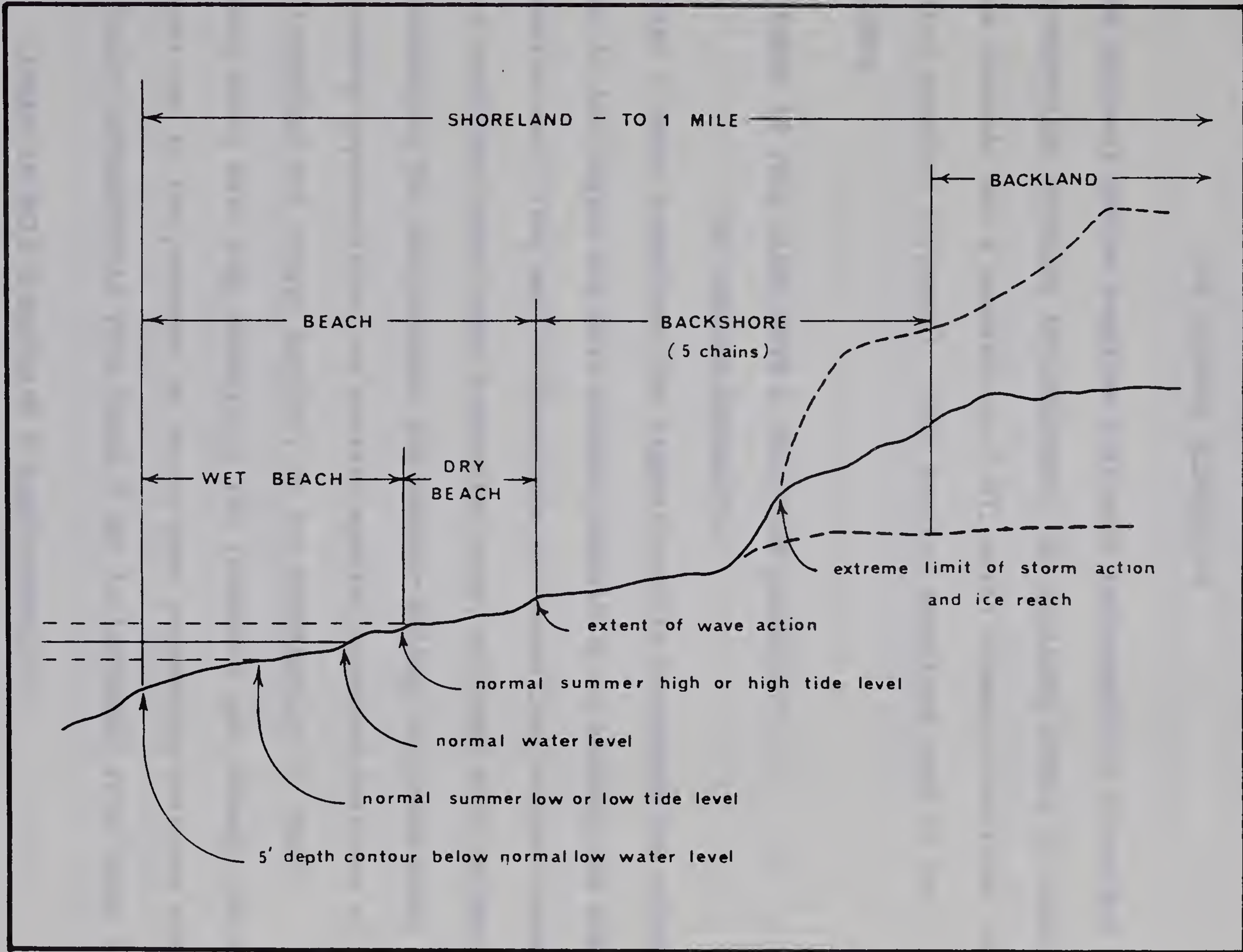
A P P E N D I C E S

Figure 14 SHORELAND PROFILE



SOURCE: Canada Land Inventory, ARDA.

APPENDIX A

OUTLINE OF THE CANADIAN LAND CAPABILITY CLASSIFICATION FOR OUTDOOR RECREATION

The national system requires that only the capability class and the kinds of recreation features be indicated. As outlined herein it contains only these elements and a separation of all units between shorelands and uplands (for computer purposes). This section describes each of the seven classes.

CLASS 1

AREAS IN THIS CLASS HAVE A VERY HIGH CAPABILITY FOR OUTDOOR RECREATION

Class 1 lands constitute the highest quality resources for outdoor recreation in the region and have natural capability to attract and sustain very intensive use. They may be shorelands with excellent natural capability for public beach and shore based recreation uses; or lands with an excellent natural capability for professional and amateur skiing; or lands which provide viewing opportunities, or contain special interest features of highly outstanding and unique quality; or any combination of these.

Lands which have high capability for intensive use through two or more seasons due to the presence of two or more recreation features each of which would independently rate Class 2 may in instances rate Class 1.

CLASS 2

AREAS IN THIS CLASS HAVE A HIGH CAPABILITY FOR OUTDOOR RECREATION

Class 2 lands are not of the highest quality for recreation in the region, but are relatively outstanding and capable of attracting and sus-

taining moderately intensive use. Modest improvements to the resource base may be necessary to realize the full potential. They may be shorelands with good natural capability for public beach and shore based recreation activities; or lands with good natural capability for competitive and amateur skiing; or lands which provide viewing opportunities or contain special interest features of outstanding quality; or any combination of these.

CLASS 3

AREAS IN THIS CLASS HAVE A MODERATELY HIGH NATURAL CAPABILITY FOR OUTDOOR RECREATION

Class 3 lands will normally have limited capability for intensive use of a public nature without significant capital inputs but are more likely to attract and sustain a high total annual use. They may be shorelands with moderate to high capability for shore based activities such as swimming, boat launching and camping, or for intensive private or commercial lodging use; or lands with capability for moderate to high total annual use associated with particular recreation attractions or exceptional viewing opportunities; or any combination of these.

CLASS 4

AREAS IN THIS CLASS HAVE A MODERATE CAPABILITY FOR OUTDOOR RECREATION

Class 4 lands will not normally engender intensive use without major capital inputs, but may engender moderately high total annual use in dispersed activities. They may be shorelands with low to moderate capability for private lodging or camping associated with access to water suited to boating and/or swimming though some improvements will be necessary for access to, or use of the water. They may be shorelands with

moderate to good capability for lodging fronting waters with low capability for shore based activities other than viewing. Or they may be lands with good to excellent capability for dispersed activities, including shorelands or other lands with high scenic quality on an extensive scale, but lacking capability to rate higher.

CLASS 5

AREAS IN THIS CLASS HAVE A MODERATELY LOW CAPABILITY FOR OUTDOOR RECREATION

Class 5 lands lack the natural aesthetic quality or the recreation features to engender intensive use, but may have moderate to good capability for a number of dispersed activities. They may be pleasant for touring, walking or riding or good for hunting, stream fishing or gathering and collecting. They will seldom warrant capital improvement except in a high demand situation. They may provide a fully satisfactory buffer zone for an intensive use area.

CLASS 6

AREAS IN THIS CLASS HAVE A LOW CAPABILITY FOR OUTDOOR RECREATION

Class 6 lands lack natural aesthetic quality and recreation features, but may have low to moderate capability for one or more dispersed activities. They will normally be uninteresting and may present serious restrictions and offer little incentive to exploration or use.

CLASS 7

AREAS IN THIS CLASS HAVE A VERY LOW CAPABILITY FOR OUTDOOR RECREATION

Class 7 lands will have practically no natural capability for any popular types of recreation activity due to an almost complete lack of recreation features. They may, however, have some capability for very specialized activities with recreation aspects such as study of biological

or other phenomena or gathering of specimens, or they may merely provide open space.

RECREATION FEATURES

The following attractions or "recreation features" are grouped to a degree as follows: Water or shoreland use features: upland use features: visual attractions. The reader may find them more usefully listed alphabetically. It may be found necessary to add to the list with further experience.

Where possible the letter symbol used relates to the feature or use.

B Bathing beach: wet and dry beach conditions suited to family bathing, at normal water levels, in terms of water quality, beach slopes and beach materials.

D Shoreland with deeper water inshore suitable for swimming or boat launching.

N Shoreland suited to family cottage or other lodging use.

Y Boating area: shorelands providing access to a water body capable of accommodating popular forms of family boating activity.

A Angling area: land providing access to water with natural capability for production or harvesting of sport fish.

C Canoeing area: land providing direct access to a stream, river or other waterway with good natural capability for canoe tripping.

W Wetland: with significant capability for wildlife viewing or hunting.

T Thermal springs.

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J Gathering and collecting: areas offering particular opportunities

for such activity.

K Camping: terrain suited to organized camping (generally to be used only when such terrain exists near, or in the same unit with another attraction).

S Skiing areas: slopes and climatic conditions capable in normal seasons of providing skiing opportunities.

O Upland with significant capability for wildlife viewing or hunting.

M Upland area containing frequent small water bodies.

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Z Major permanent, non-urban, man made structures of recreational interest.

Q Patterns of topography and land form, or land and water, exhibiting interesting diversity of landscape.

E Areas exhibiting representative and unique types of nature vegetation.

L Natural landform features of particular interest - other than rock formation: such as hoodoos, slump zones, eskers, sand dunes, badlands, etc.

H Historic site: an historic or prehistoric site or feature of a level of significance recognized by provincial or national government authorities.

P Areas exhibiting pleasing or interesting diversity of cultural landscape patterns.

R Rock formation of interest; such as caves, crevasses, exposed stratification, folding, fossil deposits, etc.

V Viewpoint or overlook: a promontory or vantage point which provides a superior view of a feature, landscape or seascape; or a corridor or other area which provides frequent good viewing opportunities.

G <u>Glacier</u> or area offering a glacier view or experience.

F <u>Waterfalls or rapids</u>.

X Recreation features of particular interest or use capability not included more specifically elsewhere.

SUGGESTED BENCH MARKS AND GUIDELINES

FOR CAPABILITY CLASSES 1 TO 6

No attempt is made in this outline to provide comprehensive guidelines for all classes. Limits, benchmarks or examples are provided as general guides only. They are not intended for rigid application. In instances, they are necessarily subjective. Additional guidelines can be added with the experience of another field season.

<u>CLASS 1 shorelands</u>:

(a) The water body should have a surface suitable for family boating and related activities of six square miles or ten miles navigable length.

(b) The unit should contain 1000' or more of beach within a $\frac{1}{4}$ mile length (i.e. if not continuous beach then nearly so) of gradients between 1% and 7% (the optimum is 2 - 5%) and materials of sand or fine gravel (up to pea size), and with water temperatures and quality suitable for bathing and swimming.

(c) There should be at least 25 acres of land well suited to construction of facilities and to intensive backshore uses in terms of slopes and materials within about 1000' of the main beach and readily accessible from it.

<u>CLASS 1 ski areas</u>:

Conditions of slope and vertical drop (at least 2000 feet) should meet international competition standards, average snow conditions should provide a long season of use, and surrounding terrain should accommodate intensive

novice, intermediate and spectator use.

<u>Other Class 1 recreation features</u> should be truly outstanding and unique in their natural capability to attract very large numbers of people under perfect market conditions. They should be of regional or national significance.

<u>CLASS 2 shorelands</u>:

(a) water body should have a surface suitable for at least limited boating of one square mile or two miles length.

(b) the unit should contain at least 300' of continuous beach, with materials of pebbles, fine gravel, sand or firm till, gradients not over 8%, and water suitable in terms of quality and temperature for bathing and swimming.

(c) there should be at least 15 acres of land suited to development and intensive use in terms of slopes and materials within $\frac{1}{4}$ mile of the main beach and reasonably accessible to it.

(d) a combination of minor limitations, or one or two moderate limitations in site quality, as well as a size limitation, may reduce a natural beach shoreland unit to Class 2. Usually, such limitations can be overcome with improvements, but not necessarily.

A Class 2 shoreland must have natural capability in terms of water, beach and backshore to accommodate intensive beach activity, or have extensive sloping backshore exceptionally well suited to tiered lodging development plus a beach usable for bathing, if not suited to very intensive use.

<u>CLASS 2 ski areas</u>:

Conditions of slope and vertical drop need not meet international

competition requirements, but will normally be the best or second best (if a Class 1 area exists) in a province or sub-region. It will have good natural snow conditions in a normal winter, good range of slope conditions, satisfactory surface materials and, usually, runs dropping not less than 600 feet. Area in usable slopes and surrounding terrain must be adequate to accommodate large number of skiers at the same time.

Other Class 2 recreation features should be outstanding in the provincial or sub-regional perspective and capable of attracting use from throughout the sub-region.

CLASS 3 shorelands:

(a) If bathing beaches are present, they will be small (under 300') in length, or steeper than 8%, or very flat, or of rock, boulders, cobbles or clay, or be backed by swamp or open water. No limitation will be severe enough to prevent swimming or boat launching at frequent intervals along the shore.

(b) Access from the shore to backshore development site may be moderately difficult, but not severely so except perhaps for short distances.

(c) Backshore materials, slopes and drainage will allow fairly intensive cottage or other lodging development without severe limitation in access or shade tree growth capability.

(d) The water body may be small, possibly down to 160 acres, if a lake. Water quality, temperature or currents must not prevent swimming.

(e) Water frontage with nearly continuous capability for family recreation or cottage use, but which does not rate higher, will normally rate Class 3.

Corridors of land which provide very attractive outlooks at frequent intervals or continuously, usually of seascapes, may rate Class 3. These may be shorelands or uplands, depending on location in relation to the

shore. The margins of the Cape Breton Island plateau, which now accommodates the Cabot Trail, may in places provide an example of Class 3.

CLASS 4 shorelands

(a) These lands may have capability for lodging use under moderately severe limitations. Possible shore conditions include extensive flats, severe boulder or rock conditions, soft bottom, poor drainage or serious weed conditions. The water body may be small, or shallow, or a river, or contain poor quality water. Limiting conditions, either singly or in combination, should however, not be of such severity that access to and use of the water for swimming and/or boating cannot be accommodated under natural conditions, or made moderately attractive through capital improvements.

(b) Backshore conditions may prevent intensive lodging use; or allow it only with considerable improvement - due to slope, materials or drainage limitations.

(c) Offshore sand bars generally accessible only by boat, or too narrow to accommodate vehicle access, may rate Class 4.

(d) Shorelands with good scenic or aesthetic quality, but with swimming or family boating more or less prohibited due to cold water temperature, severe currents or wind exposure, may rate Class 4.

CLASS 4 uplands

(a) These include land fronting on streams or rivers with good capability, normally through a long season, for a variety of dispersed activities such as camping, nature study, riding, hiking, hunting, etc., and as a base for angling.

(b) They include uplands with frequent attractions and opportunities for

dispersed types of activity, though they will usually be restricted to better quality lands of this type in a province or sub-region. Normally, surface water will be fairly frequent, terrain will be rugged and interesting, offering frequent views, and natural forest cover will be attractive and readily penetrable.

CLASS 5, 6 and 7 shorelands will have practically no capability for usual types of shore based recreation due to extreme ruggedness or inaccessibility, to extensive marsh, very extensive flats, or some combination of these. In these instances, the shoreland capability is determined largely by the adjacent land capability, and should be classified accordingly. Frequently, however, proximity to a water body, regardless of shore capability, will enhance the scenic quality of the adjacent land sufficient to lift it one class.

CLASS 5 uplands will frequently form a strip along a small stream in otherwise uninteresting terrain; or they may be extensive uplands with some topographic, and possibly, land use variety and interest, or level to rolling parklands rich in wildlife. They must have good capability for one or more popular dispersed types of activity. If they are forested, the forest must be more or less penetrable, or offer other compensatory attractions.

CLASS 6 uplands will normally be relatively uninteresting and extensive with infrequent attractions and poor scenery. They may have no serious limitations other than absence of attractions, or their low rating may be due in part to extreme access limitations. They will often have moderate to good hunting capability. Tree cover may be monotonous, too dense for penetration or too sparse or dwarfed to be useful or

attractive. Specific attractions are lacking, but the landscape, natural or cultural, may present occasional pleasing vistas and offer moderately pleasant touring opportunities. Hunting, walking and picnicking may be accommodated.

GLOSSARY

Backland: see under "shoreland".

Backshore: see under "shoreland".

Bathing: Beach activity for family groups including non-swimmers and children.

Capability: see under "recreation use capability".

Dispersed activity: Any of those recreation activities listed which either:

(a) have a high acreage requirement per person or family participating at any particular time for optimum user satisfaction, e.g., fishing and hunting, or

(b) are highly tolerant in resources requirements and can therefore be enjoyed in a wide range of land types, e.g., picnicking, and walking or driving for pleasure.

Dry beach: see under "shoreland".

Facilities: Man-made structures usually needed to facilitate visitor use of recreation features; includes roads, buildings, sanitary and water works, ski tows, etc.; does not include normal landscape improvements.

Family boating: popular forms of boating available to the average family: normally implying a relatively small boat capable of being launched and transported by an automobile drawn trailer for inland waters; or a type of family boat common to the region.

Gathering and collecting: any of those recreation activities associated with gathering fruits, berries, nuts, rocks, gemstones, shells, insects, etc., whether on a casual or serious basis.

Intensive use: a relative term referring to a recreation feature or land unit which could attract and sustain a high level of use in terms of persons per acre or visitor days per year; or a type of recreation activity usually requiring a relatively small land area per person.

Lodging: use of land for seasonal or continuous habitation in more or less permanent buildings, under private, group or commercial operation.

National system: the system in official use for the recreation sector of the Canada Land Inventory.

Organized camping: camping in grounds developed for the purpose.

Perfect market conditions: this term, where used in this outline, implies that market or demand conditions, such as location in relation to population centres, and accessibility, are equal for all areas, and therefore do not influence the relative capability of any area.

Primitive camping: camping in small or large individual groups in more or less undeveloped sites selected for the occasion.

Rating: the allocation of a class or level of capability to a land unit, or the numeric class allocated.

Recording: photography, sketching, painting, bird song recording or similar activities.

Recreation feature: a physical feature or attraction which has specific

capability for recreation in relation to any of the types of recreation activities listed. It may be a recreation use feature such as a beach, a swimming, boating or fishing water, or a ski slope; or it may be a visual attraction such as a waterfall, glacier or faunal community; or it may be both.

Recreation use capability or capability: the natural capability of land for use for any one or more of the types of recreation listed.

Region: the terms "region" or "regional" in this document refer to the large natural divisions of Canada: British Columbia, the Prairies, Ontario and Quebec, and the Atlantic provinces less Labrador.

Sub-region: the terms "sub-region" and "sub-regional" refer to vaguely defined area components of regions, synonomous with the smaller provinces, or comparable natural divisions of the larger provinces.

Shore based activity: any popular recreation activity which customarily depends upon land-water boundaries, such as bathing, swimming, family boating, summer cottaging, water skiing and lake angling.

Shoreland: this term and those below differ from definitions suggested earlier in an attempt to conform wherever possible with a comprehensive glossary of land-water terms soon being published in the U.S.A. and recommended for use of inventory groups.[1]

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[1]Humphreys and Veatch, Water and Water Use Terminology, to be published in March, 1966 by Thomas Printing and Publishing Co. Ltd., 724 Desnoyer St., Kaukauna, Wisconsin, U.S.A.

"Shoreland" (Figure 14) - is a broad term covering the various components of land fronting on a water body which is either capable of supporting popular recreation activity, or is large enough to do so (excepting streams or rivers capable primarily of angling or canoeing). Shoreland extends from about the 5' depth contour at normal low water, inland from the shoreline at least 1000' distance, to a natural or artificial boundary seldom over one miles from the shoreline.

Wet beach: the area of a beach below the normal high water line, usually outward to the 5' depth contour at normal low water.

Dry beach: the area of a beach above the normal summer high water or high tide level, but normally subject to wash by high water, or storm waves.

Beach: the width of the shore zone which includes the wet and dry beaches.

Backshore: that part of the shoreland reaching inland from the dry beach normally as far as the extreme extent of storm action or ice erosion, but for inventory purposes, it will extend inland an arbitrary distance of 300'.

Backland: that land lying inland from the backshore as defined; and for inventory purposes, extending to the inland boundary of the shoreland unit.

Upland: all land other than shoreland.

Source: C. S. Brown, for the Canada Land Inventory, ARDA, March, 1966.

APPENDIX B

PATRONAGE SURVEY QUESTIONNAIRE

The information you give will be used in a Master of Arts Graduate Thesis in Geography and the findings will help in the planning of better parks and recreation sites.

Please answer the following questionnaire. Mark N/A where question is not applicable.

Name of park, area or site............................date................

1. Your place of residence...

2. Number of people in your party: ....men....ladies....children

3. Did you come directly to this park or site? ....yes ....no.
   If no, where else have you visited?....................................
   What route did you take?..

4. Estimate length of stay here? .....hours .....days.

5. Your visit here is on .....holidays, ...weekend, ...days off.

6. Why did you come to this park or area? .....proximity to home, ...an en route stop, ...the recreational quality of the area.

7. Which of the following categories made you choose to visit this site: .....Swimming, ...Fishing, ...Natural beauty of the site, ...Boating, ...Picknicking.....Camping, ...Others (specify)......?

8. Do you consider the natural qualities (ie. the beaches, the lake water and backshore) of this site: .....Excellent, ...Good, ...Fair, ...Poor?

9. What do you like about the natural qualities of this lake?.............

10. What don't you like about the natural qualities of this lake?
    ....

11. Which of the following accommodations are you using: .....Car, Station Wagon....., Camper....., Tent....., Trailer....., Cabin....., Motel....., Hotel....., Lodge....., Boat.....?

12. Do you have a boat or canoe with you? .....Boat, ...Canoe,.....Neither.
    If yes, are you using it for:.....Boating, ...Fishing, ...Water skiing, ...Boat racing, ...Scuba diving, ...Cruising?
    If no, are you going to rent a: .....Boat, ...Motor, ...Canoe, ...Water skis, ...Fishing equipment.

13. How many times have you visited this site?.....

14. Have you visited other sites along this lake or in the area?.....Yes,...No.
If yes, give names of sites..

15. Do you intend to visit other sites along this lake or in the area?
.....Yes, ...No.

16. Are you interested in plants and wildlife of this park or area?
.....yes, ...no.

17. Would a concentrated nature program organized by a park naturalist aid you in your visit? .....yes, ...no.

18. How much do you estimate you have spent here on this visit per day:
.....($5. or less), ...($6. - 10.), ...($11. - 15.), ...($16. - 20.)
.....($21. or more).

To be answered only by Visitors at Lesser Slave Lake sites who are not from the locality.

19. Does the remoteness of Lesser Slave Lake act as a disadvantage to your visits? .....yes, ...no.

20. What do you consider a fair driving distance to a park or recreation site?
..... 25 mi($\frac{1}{2}$ hr), ...50 mi(1 hr), ...75 mi($1\frac{1}{2}$ hrs), ...100 mi(2 hrs)
.....125 mi($2\frac{1}{2}$ hrs), ... 150 mi(3 hrs), ... 175 mi($3\frac{1}{2}$ hrs),
.....200 mi(4 hrs)?

21. Does the fact that only gravel roads link Lesser Slave Lake with the remainder of Alberta affect your visits? .....yes, ...no.
If yes, explain...

22. Does the quality of the beaches and fishing warrant this long rough journey for you? .....yes, ...no?

23. If the remoteness and poor quality of roads in the Lesser Slave Lake area discourage your visits, would the paving of Highway #2 and the subsequent shortening of the driving time from the populated centres in Alberta encourage you to visit Lesser Slave Lake more often?
.....yes, ...no.

To be answered only Visitors at Wabamun Lake sites.

24. What do you consider a fair driving distance to a park or recreation site? - for a weekend? - for one day?
.....25 mi.($\frac{1}{2}$ hr.), ...50 mi (1 hr.), ...75 mi ($1\frac{1}{2}$ hrs),
.....100 mi (2 hrs.), ...125 mi ($2\frac{1}{2}$ hrs), ...150 mi (3 hrs),
.....175 mi ($3\frac{1}{2}$ hrs), ...200 mi (4 hrs.).

25. Does the nearness to Edmonton and the easy access explain your visit to this lake site? .....yes, ...no?
If no, why did you choose to visit this lake site, explain.............

26. Why did you choose to visit Lake Wabamun instead of one of the other lakes in the area? .....because, ...a good Provincial Park exists at Kapasiwin, ...the lake has highly developed resorts at Seba and Kapasiwin, ...it is near to Edmonton, ...it is on a good highway from Edmonton?

27. Have you ever visited Lesser Slave Lake? .....yes, ...no?

28. Do you know that Lesser Slave Lake is a high quality lake with many long, white sandy beaches, good fishing, several campsites, and no commercialism: .....yes, ...no?
If yes, why have you never visited it: because, it is 170 mi. distant from Edmonton ....., 50 miles of this 170 miles is only gravelled....., others (explain)...

29. If you did not know about Lesser Slave Lake's high recreation quality before; would you now visit it: .....yes, ...no? If no, why would you not visit Lesser Slave Lake, because: it is too far from Edmonton... 50 miles of the route is gravelled....., it is not completely developed and commercialized....., others (explain).............................?

30. When the route from Edmonton to Lesser Slave Lake is completely paved, will you then make the trip?.....yes, ...no?
When Lesser Slave Lake Provincial Park is completed and the area becomes developed, will you then visit it: .....yes, ...no?

To be answered only by Cottagers on Lake Wabamun

31. How long have you been in this cottage: .....years.

32. Do you use the cottage on: weekends....., summer holidays....., both...?
How often do you visit the cottage: every summer weekend....., every weekend of the year....., every day of summer....., all year round.....?
If not in winter do you ever make winter visits:.....yes, ...no?

33. Why did you choose to locate your cottage on Lake Wabamun (eg., recreation quality, nearness to Edmonton, ease of acquiring the land or the cottage):...

34. Have you ever had a cottage on another lake in the Edmonton region: yes....., no.....?
If yes, why did you move to Lake Wabamun:..............................

35. If you had previously known about Lesser Slave Lake, would you have located your cottage there instead of on Lake Wabamun: .....yes, ...no?
Now that you know about Lesser Slave Lake would you be interested in

obtaining a cottage in one of the lakeside areas to be opened to cottagers there: .....yes, ...no?
If no, why not: it is too far from Edmonton....., 50 miles of the route is gravelled....., the area is not yet completely developed..., you would not want to move from Lake Wabamun.....?
If yes, why do you wish to move from Lake Wabamun: it is overly developed and crowded....., the beaches and lake quality are poor...., you prefer more virgin lakes....., others (explain)....................

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